

New and Emerging Media in Game Design

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Artist Statement

For my senior project I set out to create a Virtual Reality game using Unity 3D and the Oculus Quest/Rift S. The game is called Operation Midnight Stripes and it was first created for Introduction to Game Design 2.0 with Dr. Geoffrey Long during my Sophomore year. Originally this was a group project, so the ideas surrounding the game were generated at the help of Christopher James Behenna, Amy Trihn, Tom Santos, Micah Andrade, and Anastacia Gonzalez. The game created is a 3 part VR escape room. The player starts as an escaped prisoner in a hangar that must find a way to get out of the hangar and meet up with the rest of their team. The player eventually escapes and ends up on a plane that crashes in the mountains. The enemies are hunting them and they must find a way to contact their team to give them their position in order to be rescued.

This project was created using the Unity game engine. This engine allowed me to use assets already created specifically for a project similar to mine. This meant that I could focus less on learning how to 3D model, and more on level design and coding. I did write several lines of my own code in c#. I also had to modify existing assets and code in order to make them work the way I need them to for my game.

I specifically chose to use Unity over Unreal Engine 4 or another alternative because it has a relatively easy learning curve compared to its competitors. I chose to use Operation Midnight Stripes instead of creating a new game because I had already experimented with creating the best version of the game previously. This game has 3 iterations, the escape room prototype, the paper prototype board game, and the VR game. Creating a new game from scratch requires significantly more time to create a digital version compared to something that already has the foundation laid for you.

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Introduction

Games and more specifically, video games are incredibly complex pieces of media. Often being made up of several equally complex parts, such as game art, the story, the world, the rule set, code (for video games), and most importantly, the player. Take away one of these parts and you get something vastly different. Different game artists use different approaches when it comes to creating games. Some will create the story and world first, focusing on gameplay and mechanics second. I will be comparing the ideas from Jesse Schell, Tracy Fullerton, Raph Koster and a few others and explaining how I was able to utilize their theories to create a better game.

Understanding Games and What they Are

The process of creating a game is extremely complex, being made up of several equally important parts, and it is rare to have a game made by one person. For video games specifically, they are made up of thousands, sometimes millions of lines of code, complex rule sets, unique and complex 3D art assets, a complex storyline, visual effects, animations, digitally created main characters, digitally created side characters, and so much more. The way all of these parts are woven together is what makes it a game. For board games or even games like TAG, they have less designed parts than video games but are still made up of many of the same elements. Games are an extremely unique and important form of entertainment in today's society. Everyone plays games all throughout their life, really up until they pass away. From TAG as a child, to playing golf to try and strike a business deal, games are forever a part of our lives. Creating a game however, is something that few individuals are able to do. Even as far as defining what a game is, or what can be considered a game is argued about by various designers and in books. For instance, Jesse Schell and Tracy Fullerton have vastly different definitions for games. Schell

describes a game as “Games are something that can be played but that is confined by rules. Games have goals that can be obtained through different outcomes, whereas puzzles always have the same outcome, making it so that repeating them is not very fun.” The satisfaction that revolves around completing a puzzle or game is similar, the difference is the player may feel compelled to redo a game but not a puzzle. A puzzle has the same way of completing it every time, just placing pieces in different orders. A game can be completed through various different methods. Most games now allow the player to complete quests in a different order on each playthrough. This allows for a different gameplay experience each time the game is completed. Although Jesse’s definition of a game isn’t the only one, most designers agree that the first step to designing a game is being able to critically analyze games. Being able to nit pick, break apart, and determine what works and what doesn’t, and why is a crucial part of being a game designer. Also submitted with this paper is a critical game analysis of *Cyberpunk 2077*, a recent entry in the open world RPG category that came out in late 2020.

Being able to conduct a critical analysis of a game that you, as a player might love, is what separates the game designers from the players. A critical game analysis allows designers to think about the game from the perspective of the makers of the game. Comparing the use of similar game mechanics from game to game and being able to understand from a player perspective, why one game does it better than another is what allows game designers to push the boundaries of game mechanics. Tracy Fullerton discusses mechanics and how discovering new mechanics relates to game analysis. In the world of games in 2021 and the future, game designers often find themselves reusing the same game mechanics and loops when creating games. However being able to conduct a critical game analysis can give designers new ideas to change up an old formula for games. For instance, the Legend of Zelda: Breath of the Wild,

arguably the best in the franchise and one of the greatest games of 2017 added several game mechanics to change up the traditional 3rd person Role Playing Game (RPG). RPG's generally take place in an open world that allow the player to endlessly explore, complete missions, and defeat enemies. When the player would defeat an enemy in a traditional game, the enemy would drop a weapon. If the weapon was better than what the player used, they would equip it and use it until they found something better. What *Breath of the Wild* did was added a health system to weapons making it so your beloved legendary sword could only be used so much before it inevitably broke and couldn't be used again. For a fantasy game, this was an amazing mechanic that really made players think before engaging in combat with enemies, that and the fact that a player could logistically only hold 5 melee weapons, 5 bows, and 5 shields at a time until they upgraded them (another game mechanic they put a spin).

The Importance of Prototyping

The early stages of development are often known as prototyping. The last thing a designer wants to do is go through the process of hiring actors, artists, programmers, and a whole staff to create a game and finish the game, only to find out it is not fun. "Another key component to a playcentric design is that ideas should be prototyped and playtested early." (Fullerton 12). There are many stages of prototyping a game. Typically, the first version of a game is the paper prototype. This is a basic form of prototype that is made of materials the designers can find around their house or workplace. This form of prototype is designed to show sponsors or project backers that the simple version of the game is still fun to play, even without the flashy art, or fancy programming. There is a second prototype in the later stage of game development. The digital prototype is equally as important, specifically for video games. Both of these prototypes are used to show off the core gameplay mechanics and loops.

When prototyping a game, it is made up of several parts that allow the design to better their game. One of the major components is design documentation. While prototyping and playtesting, designers tend to take notes and write down thoughts from their testers on things to improve, bugs, what is fun and what is not, and goals to complete before the next prototype. Usually this document establishes the core loops, verbs, and mechanics of the game prior to actually testing it, simply so the designers have a copy of what it is they are testing.

Unfortunately, there is very little innovation in the digital game space. "Many games are simply variations on standard game mechanics" (Fullerton 21). Both paper and digital prototyping stages are skipped for most modern games. Tracy Fullerton claims that large game studios are choosing to reuse the same formula, to create the core elements of the game and just add some small changes to make it unique. When looking at 3 of the largest game releases of 2020, which are *Assassins Creed Valhalla*, *Cyberpunk 2077*, and *Ghost of Tsushima*, these three games are basically the same when looking at it from a stripped down, basic version of the game, point of view. Each of these games are an RPG (Role Playing Game). The traditional mechanics of these games are to scavenge the world for resources to craft and upgrade clothing/armor, food, weapons, and in some cases other objects in the world. Each of the three games listed follow this general formula for RPG's. However they each put a spin on it. *Cyberpunk* adds Cybernetic enhancements that allow the player to do special abilities. *Assassin's Creed Valhalla* adds the ability to raid locations for materials to upgrade your settlement, which inturn gives you access to other abilities needed to progress the story. *Ghost of Tsushima* is the most basic when looking at the formula, but one of the best games of last year. The developers made the game incredibly basic, the crafting was limited to upgrading weapons and armor. But players were limited to one weapon for the whole game and there were very few armor sets to pick from. Unfortunately

Tracy's claim of little innovation seems to be true. However this is not without good reason. These massive, open world style RPGs can take several years to make. *Cyberpunk* for instance was first announced in 2013 and came out in December of 2020. That was just the announcement. Who knows when they started development. By copying the fundamentals of games, gives the developers more time to come up with creative ways to put a spin on it.

What is a Loop/Mechanic?

Well, it's in the word. Loop: a shape produced by a curve that bends around and crosses itself. A gameplay loop is formed off a similar idea. They are the repeated actions a player makes during gameplay that help the player understand "How players learn the game. What skills players acquire and the other in which they acquire them. What portions of the game are breaking and causing confusion. How small interactions in a game are tied into the most complex interactions" (Fullerton 153). These actions are often repeated all throughout the game up until the story/game ends. Most games have several gameplay loops that boil down to smaller and smaller loops until you get to the foundational loop. For instance in the Mario franchise, the loop would save Princess Peach. After each series of levels you battle a small boss to try and save Princess Peach, but each time they get away until finally you beat Bowser and rescue her, in which case the game ends. However we can go simpler, all the way down to run and jump to avoid enemies. There are many more loops in this game, as are in most games. In *Assassin's Creed Valhalla*, the player "pledges" to help other settlements in the game. This involves a similar structure of missions for each of them. After completing a number of these pledges, the player can progress the main story a small amount. This is the overall game loop to advance the story, however the basic loops are loot/scavenge, be stealthy and avoid enemies, and climb/parkour. Players often don't think too much about a gameplay loop when playing their

favorite game, but gameplay loops are everywhere in games and they are incredibly important to the players progression to the game and it's story.

Skill chains are the combination of basic, foundational loops in order to perform a higher level action. "Mastering simple interactions enables players to complete compound interactions" (Fullerton 154). Games use skill chains like this in order to give players a sense of mastery as they progress through levels and the world. The Mario franchise uses the basic mechanics of jumping and running and combines them to do almost everything else. For instance, killing a Goomba, a simple enemy in the Mario games, combines running and jumping, but the jumping and movement must be precise in order to land on the Goomba and actually destroy it. This makes it so that players must learn the basic skills in order to perform certain actions. In most RPGs, there will be a literal skill tree filled with hundreds of skills players can unlock. In *Assassin's Creed Valhalla*, players must learn how to dodge and perry certain attacks. One of the skills players can learn in the game is the "Perfect dodge", where upon a perfect dodge, time is slowed down so that the player has time to attack their enemy while vulnerable. Not only does the player need to play the game a lot to earn enough skill points to actually learn the skill, but they must master dodging to even have a good chance of putting it to good use.

Game play loops tend to be the main foundation for a game, they are what gives the game it's uniqueness and what makes it fun. Designing a game play loop can often be tricky though, which is why modern games are reusing the same loops as games before them. Many game series will create the first version of the game that is released, and then simply reuse and build off of it for the sequels in the series. For instance, the *Assassin's Creed* series has been doing this since the initial game came out in 2007. Each one has added new loops and mechanics to the game. *Assassin's Creed: Origins* was the first in the series to introduce a bird companion that

allowed users to explore areas as a flying bird that has a much better view. The same happened with boats/ships in the series. The boats are different, and used differently in almost every game they make an appearance. The newest installment in the series changed it drastically from the last game, allowing players to sail a viking longboat throughout England as a primary form of travel and for raiding to gather supplies for the in game settlement. Raiding could only be done if the player was on the longboat with their crew however, making it so the boats were a primary mechanic players had to rely on. The previous game used boats as a form of combat and travel, making it so that players typically had to perform missions that involved fighting with enemies on the boats. Unfortunately, this was implemented rather poorly and most players ended up using fast travel to get around the world and avoiding those missions at all costs.

Game mechanics are similar to loops but also drastically different. While a loop is the fundamental repeating aspect of a game, gameplay mechanics are the actions that players perform then ultimately break down to the loop. A game's core mechanics are truly what makes or breaks a game and determines how enjoyable it is. Game mechanics can be extremely simple though. They can range from simple objects in game to the chance and skill level. Common mechanics often expand as a play progresses through the game/story. One example of this is an online multiplayer franchise, Call of Duty. Every Call of Duty game has a leveling system. When the player plays the game, they earn experience points that allow them to level up. At each new level, the player unlocks something that allows them to use new equipment and continue to improve as they find the best loadout that suits them. One of the biggest problems with this mechanic was what do you do after you level all the way up? Prior to 2019, the developers implemented a prestige system that allowed players to reset their rank back to level one and start all over with unlocking the equipment again. Now, there's a "battle pass" system that gives

players new equipment, but also extras such as skins, audio quips and a lot more. Some other common mechanics found in open world games are the unique combat systems. Most games that have melee combat usually have a regular attack and a strong attack as well as a bow and arrow. By giving all three to the player, it lets them choose their best fighting style. They also usually have a choice of weapons as well, allowing them to create a kit/loadout that best suits their style of play. Game mechanics are designed strategically and specifically for each game, but are often mimicked or copied in a world that lacks innovation in the game industry.

Puzzles are Old Fashioned but Necessary to Games

When talking about a game to someone, they often don't think of it as a puzzle or that games have puzzles in it. Both Fullerton and Schell claim puzzles are a type of game. Schell even goes as far as to claim a game is a puzzle. Fullerton however, claims "Games are rule based systems in which the goal is for one player to win. They involve opposing players who acknowledge and respond to one another's actions. Puzzles are rule based systems, like games, but the goal is to find a solution, not beat an opponent." (Fullerton 43). This is why Schell claims that some games are just puzzles. Story games that only have one outcome and are single player, are really just a puzzle because you don't "win" the game. A player can beat it, but that is not the same as winning.

Most games are made up of several puzzles, otherwise the gameplay would be extremely repetitive, not really giving the player much to do other than the basic mechanics like fighting. "It can be argued that any time a player stops during gameplay to think, they are solving a puzzle" (Schell 252). When people hear the word puzzle, the first thing that comes to mind is a traditional "500 piece puzzle", something that is a picture made of several different pieces, and is solved by putting the pieces together. Puzzles in games add significantly to this example. Escape

rooms are often thought of when discussing puzzles in games. Escape rooms are a series of puzzles that tell a story as you progress through the room with a goal of finding a way to escape. The only problem is that they aren't really replayable. Once you solve an escape room, you know how to do it and there is no reason to go back and redo it. This is why most video games are now giving multiple endings to the game, or a significant amount of quests/side quests to complete after the player finishes the main story or multiplayer to be played.

One of the hardest parts of puzzle design is making sure the players know whether they are doing it correctly or not. Most games that incorporate puzzles will give the player a way of showing that they are doing it correctly. This could be as simple as vibrating the controller when they are close to solving the puzzle, or as complicated as implementing smaller puzzles that show the player slowly how to solve the main puzzle. Games will also reuse the same puzzle types throughout multiple sections of the world. Most story worlds will progressively get more difficult as the player progresses through them, allowing for the puzzles to get more difficult. In the game, *Immortals Fenyx Rising*, they have puzzles that involve moving cubes to form a picture. Similar to the traditional puzzle just in a video game. As the player progresses through the world, they start to combine this puzzle with other puzzles that must be solved first in order to unlock some of the pieces in order to complete the main puzzle. This is one of the best ways games can implement a puzzle difficulty to continue to challenge the player as they continue to raise their skill level in the game.

The last thing that makes up a good puzzle in games are end rewards. Rewards for solving puzzles in games can vary significantly depending on the type of game. For instance, escape rooms can feel like there isn't much of a reward until the player finishes the game. However there are some rewards. For example, the game might give you clues at the beginning

of the game that are for puzzles to be solved later. So solving the initial puzzles that open up the other clues for other puzzles that the player had been struggling with for a while might feel very rewarding once completed. Rewards in video games are rather easy to understand. The player will usually solve the puzzle and be given an upgraded weapon, upgraded piece of armor, tokens to unlock new skills, etc. This method of rewards and puzzles creates incentive for the player to explore the world more than just what the main story shows you.

Puzzles are an important part of the user experience. They can often show players how to play the game and teach them new skills. This is done so that as they progress through the story, they develop a higher skill level in order to stay entertained by the game. Games that don't have a good of balance difficulty and reward systems will fail to retain players. Although old fashioned, puzzles continue to prove to be a necessary factor in all kinds of games.

You Can't Have a Story Without a World

World development for games is one of the most important aspects of game design. When talking about creating a world for a game, this is often misunderstood. As much as creating a world is creating the physical environment that game is played in, it is equally as much the narrative design document (NDD). This document is designed to give designers the tools to create a unique story and world that their game can take place in. The NDD can be used for more than just games however. The Marvel Cinematic Universe is a good example of how the world is created and these stories take place in the world, allowing for team ups, cameos in movies, plots that carry over from one movie into another, and so on. Games do a similar thing when utilizing the NDD to its full potential. The Assassin's Creed franchise spans 23 games, 13 main storylines and 10 spin offs designed for portable game systems. Each of these games finds a way to connect to the complete story being told. An even better example is the Tom Clancy storyline. Originally

based on the books written by Tom Clancy, Ubisoft has made several games based on them. Some of the games are based on a series, such as Ghost Recon series and The Division series, however both of these game series connect to *Tom Clancy's Rainbow Six: Siege*, a competitive first person multiplayer shooter game. These games feature camoes from characters of the other games they are connected to.

Creating a story world has many different parts that make it work. The first thing that designers must do when creating a world is establish a “What If?” statement. This usually starts pretty basic, like “What if superheroes existed?” or “What if there were wizards in the world?”, but must be more defined after. For the superhero example, the creator might go and create a “what if” for each superhero they wish to create. What ifs don’t have to be completely fiction though. A what if can be something as simple as alternate reality, like “What if the Civil War in the US didn’t happen?” This gives opportunities to create an alternate future based on this idea. Really the future could be based anytime between the Civil War and infinitely forward in time. The What if is the foundation of the NDD and for good reason. If a designer chose to start at characters and then created the what if, this could make for characters that don’t really fit into the world. Characters give a world and story life, it is what players get attached to in games and media and why they love them.

Rules That Can’t be Broken

Rules are a necessary part of creating a functioning game that revolves around fun and unique game play. Without rules, a game is basically a puzzle. Rules can be both extremely simple, such as the player is limited to 100 health at the start of the game. Rule systems are given as guidelines to players, enemies, game objects, weapons, vehicles, etc. Each rule can have subclasses of rules that are more specific. For instance, the player can have 100 health at the start

of the game, but if they are able to gather 50 leather and 50 cloth, they can upgrade to 200 health. Tracy Fullerton discusses designing rules with the player in mind. Players are the core subject of a game, without them there is no one to play the game. However she claims that in order to retain players, the ruleset needs to be simple enough that the players are able to manage how they understand and play the game. “It is important to determine exactly what are and are not the rules” (Salen and Zimmerman 120). If the rules are not explicitly implied or stated at the start of a game, the player might be left stuck or not wanting to play a game because they thought they could do something that they can’t.

When discussing rules for a game, players often think of a board game or card game, something which typically comes written down and can read and reread until the player fully understands the game and is ready to play. Digital games drastically simplifies this by implementing rules into the game. Players often don’t realize something is a rule when playing a game. Common digital game rules are not being able to climb certain areas, not being able to jump more than 2 feet, max health, max speed players can run, and so on. Creating rules in VR is fairly straightforward when compared to regular digital games (both 2D and 3D). There are some extra rules that need to be implemented, such as not being able to move the players head through an object. Due to the way VR games are designed, the player does not have a collider on their body, forcing them to collide with other objects. When a player gets too close to an object, they can stick their head right through the object, allowing them to cheat and see what is potentially the next clue or area.

Rules are what make games fun and entertaining, however there is a unique form of rule breaking that has a very large community. Speedrunning is when individuals find and exploit certain rules in a game that don’t work properly in order to complete the game as fast as possible.

World record speedruns are set for games all the time. Games that could take the average player days to complete, the speedrun might be done in 30 minutes. The average player will spend upwards of 50-60 hours to complete *The Legend of Zelda: Breath of the Wild* but the world record speedrun is just 1 hour and 35 minutes and 51 seconds. This 50-60 hours is not just the main story however, many players spend significant time exploring the world, finding equipment, solving puzzles to gain more health and stamina. This speedrun is simply completing the basic amount of missions to get the achievement for finishing the game. Rulesets for both digital and physical games give guidelines to the players that allow them to understand and enjoy the game.

Transmedia Storytelling

Transmedia is an extremely powerful and important way to tell stories of all kinds. These stories are told across several different media, but instead of retelling the same story, it is simply continued on in a different medium. It is not as simple as making a movie that was originally a book. These stories might start as a movie or series of movies and end up as TV shows, video games, book series, comic book series, told through posters, etc. Most people know Star Wars from the 9 movies and Disney animated series, but there are also comic books that add shorter stories to the world. Marvel is currently in the process of expanding their story world onto the screen at home through the series of *WandaVision*, *Falcon and the Winter Soldier*, *Loki*, and *What If?*. Each of these expand on the 23 Marvel movies that make up the first 3 phases of the franchise. Transmedia world and games allow for the developers to continue to fill in their story through other forms of media while they develop their game. Games often take several years to make, so transmedia worlds allow the story writers to set the scene/tone of the world in advance of the release of the game. A game that was recently released, *Cyberpunk 2077* was doing this

prior to the launch and has continued since. They were releasing short stories as comic books set in Night city, the fictional world the game takes place in. These helped to continue to build excitement for the game for months before it came out and was released as the most anticipated game of the year and broke the record for most pre-orders on a game. Transmedia allows for writers and developers to use new mediums to tell their stories, giving the user an experience that they can fall in love with.

New Media

When the HTC Vive came out in 2016, it was considered the pioneer for modern VR, unfortunately it was blocked due to the majority of people due to the high price and need for a stand alone desktop computer capable of running modern games. The Vive was followed by the Oculus Rift's rough launch because of the lack of games. Both headsets were over \$600, not including a PC. This made the technology rather unobtainable to the majority of people. Oculus was purchased by Facebook in 2015, long after the Rift was on schedule for release. But in doing so gave Oculus the path to make VR more affordable. In 2018 Oculus released the Rift S and Quest. The Rift S was an upgraded version of the original rift but cheaper in cost and lacked some of the higher end features. It still required a stand alone PC to run games but it didn't need to be high end. The Quest was what people were excited about, it was the first standalone VR headset that didn't require a phone or computer to play games. "It's clear that virtual technologies will fundamentally change the way we learn, shop, build, interact, and entertain ourselves. They will open up new vistas of thinking and sensory processing. They will also make things possible that once seemed unfathomable: touching a rare fossil, swimming with sea turtles, exploring a spaceship, and experiencing a famous edifice such as the Taj Mahal, Eiffel Tower, or Lincoln Memorial" (Greengard 120). The Quest had its own CPU and GPU and ran a

version of Android OS. This was not only exciting for people interested in playing VR games, but also for game developers who develop for the new platform. Similar to VR, Augmented Reality can be run using a smartphone's camera to control the scene. These are more often used to see if furniture will fit in a certain space, but games are being developed. Apple was one of the first major corporations to enter the AR market, and continue to show it off every year at their annual keynotes. I specifically chose to develop for the Oculus Quest for two main reasons: The first reason is that it is more accessible to the average person.. As mentioned before, headsets have come down in price but still require a high end gaming PC to use them. The second reason is that it can be played almost anywhere (Oculus doesn't recommend playing outside during the day because it will damage the sensors). Since the Quest doesn't need to be tethered to a computer, players can take it with them to their friends house, families house, etc. It makes for a really cool party trick.

VR and AR are genuinely an interesting form of entertainment. On one hand they aren't nearly as popular as console gaming or PC gaming but there is so much experimental gameplay to be discovered on this platform. VR specifically, tracks a person in 3D space so that it can track their movement and position. This makes it so that developers can implement features that could not typically be implemented in a traditional console or PC game. For instance, developers can implement gesture movement and hand gesture control to allow for more creative controls in a game. Gesture control can be used for a multitude of things, from tracking velocity when someone throws something based on how fast they moved their arm to creating custom gestures that allow the player to perform very specific actions in a game. VR helps push game developers and designers away from Tracy's claim of no innovation in the game space.

Developing for the Quest did pose some unique challenges I would not have faced otherwise, such as SDKs (Software Development Kit), NDK (Native Development Kit) and APKs (Android Package Kit). Each one of these is unique when developing for the Quest. An issue I ran into more than once when exporting my project for testing, was an error where Unity was using one version of an APK and the Quest was using a different one. Since they were different versions they conflicted with each other causing the build to fail. This was one of the easier problems to fix, simply deleting the older one solved the issue. Something else I discovered that is not well documented, in order to develop for the quest, a version of Android Studio must be downloaded and installed alongside Unity. Once installed, individual SDKs had to be installed and linked to Unity for use. All though developing for the Quest proved to be challenging, once the initial set up was complete, it was smooth sailing moving forward.

Playtesting

As I mentioned earlier, prototyping and playtesting early helps significantly when developing a game. Although playtesting and prototyping are different, they are a similar idea. Prototyping helps show a game idea works, playtesting is used for finding and solving major and minor problems in a game, both code and visual. Unfortunately, the game I developed to go alongside with paper, I had very small amounts of playtesting due to the ongoing pandemic. I was able to get the game files to my sponsor, Dr. Geoffry Long who got to playtest it and give feedback, as well as a close friend of mine, Caitlin Greenup. My girlfriend Maggie Keller got to test concepts and ideas as I developed them as well as she will be playing through the demonstration in my final presentation. As I continued to develop my game and test certain ideas to see how well they worked and fit in, receiving feedback from someone helped to determine

how well it worked, especially in Virtual Reality where making sure the player is comfortable is incredibly important to a successful game.

Although playtesting proved to be a bit of a challenge while developing, the project was able to be tested by 3 separate individuals. The first player had never played a game in VR before and did not know what to expect. Going into the game, she expected it to be similar to an escape room. Throughout her playthrough, she found herself confused by the controls of the game and that it was a little difficult to perform certain tasks because of how precise you had to be with it. This player did not exploit too many bugs because they did not know what they were doing as much.

Player two has some experience in VR but did not own their own headset and hadn't done it in several years. They proved that the game was challenging for the average player but still fun and excited to play through. They played an early version of the game that was not fully complete because of some of the things that needed to be worked on throughout the design process. The known bugs were told to her in advance so she knew what was and wasn't normal/expected to happen.

The final player was very experienced. They regularly play VR games and own a headset. They also play video games in their free time, giving them an upper hand on understanding what to do. He was very helpful with finding and exploiting bugs in the game, because he would purposefully try things not meant to be tried or done. This was actually extremely helpful because now the game was in a much more polished state after each time he played through it.

Operation: Midnight Stripes

Operation: Midnight Stripes originated from a group project in Game Design 2.0 with Dr. Long, my project sponsor and academic advisor. The game was originally intended to be a series

of 10 escape rooms, where groups of 3 would play through 3 of the rooms and then meet up with the other 2 groups to play the final room together. It was a fun way of changing the traditional escape room up and giving us several different prototypes at the end of the semester. After receiving permission from my group, I decided to take Operation: Midnight Stripes and turn it into a virtual reality game. This game takes place in the 3rd series of rooms that take place in Japan. The VR game takes place immediately after a board game I created during an independent study with Dr. Long. The game is rather basic but the setup was among one of the most difficult parts. There are several different ways to create a VR game using Unity. Oculus has a complete guide showing people how to set up the camera rig, controllers, hands and several other interactions to make the foundations of a game. The tutorial is a couple years old and VR development has gotten significantly easier since then. A relatively new add on to the Unity Engine is the XR toolkit which allows for both VR and AR development for any headset. The only downside of using this is I lost the ability to use some of the features Oculus showed developers how to use in their tutorials. I eventually overcame this by writing a few lines of my own code that allowed me to play animations I created, audio I sourced, and trigger other events in the game.

Operation Midnight Stripes, the game was prototyped 3 times. Two separate paper prototypes were created and tested before opening any sort of 3D game engine. The first prototype was an escape room, where props, sound, and small pieces of artwork were created and used to submerge the player in the game. This prototype allowed us to lay out the actual room and puzzles and see if they would work digitally. The second prototype was a board game based off the same foundation created by the escape room. The puzzles had to be changed in order to fit the new version of the game. Testing this version of the game proved that even at the most basic

level, the game was fun to play and easy to understand the story. Lastly the digital prototype. This was an ongoing process of implementation and testing. Once I would get something to work in the game I would immediately test it to ensure it worked. Throughout the development process, a test subject was used to ensure it worked from a non-designer perspective. Once each section of the game was completed it was playtested. The 3 parts put together created the entire game and was no longer considered a prototype at that point.

The game is made up of 3 major parts. The hangar, the plane, and the cabin. The hangar is the first part where after escaping from the jail cell the player must find a key to open a cabinet, which has half of the keypad code, then find the other half of the keypad code and enter it correctly. Once entered, the sirens will sound, and the plane doors will open and the player must enter. Once on the plane, it transitions to the plane flying itself to the Kremlin in Russia. Suddenly the plane suffers an explosion and loses a propeller. The player must investigate the explosion and attempt to make repairs. A second propeller is lost and the plane is falling out of the sky. The plane crashes in the middle of the mountains in Russia. The Russian military is on their way to arrest the player. The player needs to find their way into the log cabin quickly and make contact with the other squadrons to alert them of what has happened. After searching the house, the player finds a small handgun, something to defend themselves if they are caught. Suddenly a helicopter shows up. The player must escape on the helicopter and the game ends.

Throughout the development of this game, I ended up restarting the entire process several times. Sometimes by choice, other times because of a devastating error that made the project unrecoverable. The creation of this game was challenging and extremely difficult but I am glad I was able to complete it. I look forward to being able to start my next project and utilize everything I learned from this one.

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