5-2024

Neurodivergent Gaming: Critical Game Design and Scholarly Practice

Mary Samblis

Neurodivergent Gaming: Critical Game Design and Scholarly Practice

By

Mary Samblis

A Thesis
Submitted to the Honors College of
The University of Southern Mississippi
in Partial Fulfillment
of Honors Requirements

May 2024

Approved by:

Dr. Craig Carey, Ph.D., Thesis Advisor,
School of Humanities

Dr. Matthew Casey, Ph.D., Director,
School of Humanities

Joyce Inman Ph.D., Dean
Honors College

ABSTRACT

This showcase of interactive experiences is designed to simulate and explore the hidden struggles of neurodiversity using game mechanics. It draws on my personal experience as an individual on the autistic spectrum to explore the relationship between game forms, academic scholarship, and critical thinking. The showcase aims to demonstrate the scholarly side of video game development and what video games, as a medium, have the potential to become within academia. Unlike articles or videos, video games have the unique quality to be interactive and immersive, allowing designers to experiment with mechanics as a tool for creating thoughtful and reflective experiences. Drawing on theories of critical game design, my interactive showcase and its critical introduction utilize the language of games to reflect on some of the challenges faced by neurodivergent individuals.

Keywords: Game Prototype, Neurodivergence, Game Design, Play, Development, Unity

ACKNOWLEDGMENTS

I am extremely grateful for my thesis advisor for teaching me about the scholarship of play, the design of games, and the existence of critical game theory. I could not have completed this thesis without his help with putting scholarly words to my passion for video game design and development.

I would also like to thank the Honors College itself for giving me the tools and resources to foster my education. I was awarded the Discovery Scholarship, an honor that financially assisted me on the development of this thesis. I am extremely grateful for the Honors College and what they have allowed me to become and accomplish.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

CHAPTER I: Introduction

In the past few decades, the social and cultural importance of video games has expanded to become more than just a means of entertainment. With the recent shifts in focus to play within education, video games have become a useful tool for academia. The current advancements in video games can be integrated into educational curricula to promote the act of play within the context of higher education (Martell, 2014). Scholars are increasingly interested in how video game design and development can be used to facilitate academic conversations. James Coltrain, for example, in his article "Can Video Games Be Humanities Scholarship?", finds in the notion of game mechanics the potential for new syntax and grammars of scholarship. As he writes, "a historian may reduce an entire decade to a single sentence, while a game may compress the same to a click" (Coltrain, 2019). Similar to the experimental tradition of oral histories and academic podcasts, which regularly supplement text with audio and visual elements, video games are poised to become a valuable alternative means to practice, perform, and publish humanities scholarship. Their promise of immersion and interactivity, meanwhile, makes them particularly well suited to reflect on the embodied and individualized experience of human perspectives and situations.

To confidently discuss the medium of video games, it is important to first touch on game design as critical and creative practice. In her book *Critical Play: Radical Game Design*, Mary Flanagan (Flanagan, 2013) defines critical game design as the practice of using game elements to ask social and cultural questions. She states that games "create cognitive and epistemological environments" which put the player into a meaningful experience (6). Likewise, in *Experimental Games: Critique, Play, and Design in the Age*

of Gamification, Patrick Jagoda (Jagoda, 2020) describes the process of game design as a tool for the generation of concepts and a strategy for creating new, experimental gaming environments. “Games do not merely represent or simulate reality,” he writes, “but also serve as an experimental form that has the potential to alter the conditions of the historical present” (xi). Furthermore, “games are platforms that use mechanics to generate moves, affects, rule variations, mods, tactics, strategies, and indeed concepts that did not exist prior to play” (277). By allowing designers and players to manipulate different mechanics, video games are a diverse medium which can be used to create and explore different concepts, feelings, and experiences.

Drawing on these definitions and insights, my thesis asks: How can critical game design, in both theory and practice, be used to complicate our understanding of the difference between neurodivergent and neurotypical experiences? How can the medium of video games be used to explore our understanding of neurodiversity, while introducing new perspectives that challenge neurotypical experiences? In answering these questions, my overall goal was to think about how game design can be utilized to create innovative virtual spaces in which players can learn about underrepresented perspectives through interactive play.

While reading an article or watching a video can allow someone to gain information about a topic, video games create unique situations where players must actively engage with a simulated environment through rules and mechanics. While these rules and mechanics vary, game designers often utilize these interactive elements to create empathy in players, allowing them to participate in a different experience or perspective. In their interaction with games, players can infer the thoughts, feelings, and

plausible actions of a video game, combining both cognitive and emotional empathy (Belman, 2010). *Arise: A Simple Story*, published by Untold Tales and Techland, for example, uses a mixture of art, ambiance, and environmental progress checkmarks to tell the story about the cycle of grief within a lifetime. Developed by Piccolo Studio, the game portrays a powerful message in the form of a wordless story, simple mechanics, and moments of player reflection. Another popular game, *Papers, Please* (Pope, 2013), puts the player in the position of an immigration inspector at the border of a made up country. Combining narrative and puzzle mechanics, Lucas Pope uses the medium of games to reflect on topics such as immigration, terrorism, and corruption in a way that simulates real-world scenarios within the safe space of interactive play.

These video games allow for safe and creative ways to demonstrate different perspectives to those who have never experienced them before. Although the empathy given from these video games is useful to understand, it is not without critique. The rhetoric of empathy in video games often implies a dominant, neurotypical perspective as the normative default, which has led some scholars to argue that the rhetorical empathy undermines the experience of neurodivergent individuals by appropriating and making assumptions about another's perspective (Ruberg, 2020). While empathy within games and game studies has its critics, it retains value as a useful heuristic tool for designing games that reaching a specific audience and for highlighting the differences between experiences. In my case, I connected the concept of empathy to the struggles faced by the neurodivergent community, who commonly deal with feelings and experiences that are difficult for most people to understand. Thus, while the showcase draws on my personal experience and works to create empathy, it is anything but an exact representation of

neurodiversity, nor does it claim to represent the unique experience of all neurodivergent individuals.

Inspiration

I first learned about neurodiversity as a child, but my understanding of the concept has grown with ongoing scholarly research. According to the Harvard Health Medical School, "neurodiversity refers to the diversity of all people, but it is often used in the context of autism spectrum disorder (ASD), as well as other neurological or developmental conditions such as ADHD or learning disabilities" (Med, 2021). More generally, neurodiversity is commonly associated with autism and ADHD, both of which I include in my broad use of the term. While the contours of different definitions vary, my use and understanding of the term for this project focuses on the unique cognitive and sensory perspectives associated with autism and ADHD, typically the struggle with sensory issues, taking thoughts too literally, and not being able to connect context clues. For this project, my representation of neurodiverse perspectives is based off my own personal experience with autism and ADHD. I have designed the showcase not to reflect the entire range of neurodiverse struggles, but simply those which I have deemed most important to showcase given the constraints of an honors thesis, my time and developing skills, and the current state of game development.

My personal experience growing up with undiagnosed autism spectrum disorder caused me to feel as if I was never able to be "seen" by those around me. It was very difficult for me to explain my point of view because I did not realize that it was a complete contrast to what people around me were experiencing. This difference caused

an experiential gap between myself and my family, since they would often feel frustrated by my words and actions during moments when I failed to understand a situation or the context of a situation. One common example would be when I would "talk back" by explaining my part of the story, failing to recognize that the context actually called for an apology, a letting go, more listening, or some other action. My failure to recognize and play by the rules of a specific language-game would lead to frustration, anxiety, conflict, and an endless cycle of miscommunication. Without proper understanding, I was unable to diagnose or fix these problems since I had no way of perceiving, let alone conceptualizing, the response that was being asked of me. I felt like I was playing an entirely different game.

It makes sense, therefore, in retrospect, that another inspiration for this project is my own experience playing video games. I have found myself interacting with games in unique ways, as opposed to the intended method. My favorite types of games are casual and sandbox, typically those that involve worldbuilding within a system of constraints. The reason for this is that I have always played games with two separate mindsets: as a "normal" player seeking progression or victory, and as an "outsider" attracted to more creative and alternative paths. The former subject position involves playing the game as intended, following the regular progression or story that structures a game's design. The latter method, on the other hand, involves my own unique and personal "metagaming," which typically involves the creation of my own stories, characters, rules, and modes of progression; the term metagaming refers to practices, games, and any other information brought to a game from the outside in order to influence play. My own play and metagaming, in other words, has taught me how to play games for an unintended purpose

and was the first inspiration behind my desire to learn about game design as a medium for meaning and communication, not just fun and entertainment.

My second experience with video games, particularly serious games and critical game design, occurred during the Honors College seminar, "Games for Change," taught by Dr. Craig Carey. This course legitimized video games as an academic object of study, introducing me to critical game theory, serious games, and the act of play. During this course, we explored how video games are used to create meaningful discussion on serious topics. Primary course objectives included understanding the relationship between games and scholarship within academia, becoming aware of different perspectives in games, and being able to incorporate video games into our respective scholarly disciplines. We achieved these objectives by learning and researching serious games, play theory, and critical game design, exploring the affordances of games as a tool for research and pedagogy.

In one project, students were asked to create a simple text-based video game on a topic of choice. This was my first experience creating a game that intentionally and self-consciously tried to influence and impact the player, rather than simply entertain them—a seemingly simple turn, but one that changed my critical sense of what games could be good for. In response to the prompt, I created a short interactive text, mostly narrative-driven, about my experience with depression and my "emotional support animal" (ESA), my cat Ember. Inspired by the linking mechanics of text adventure games, I designed the game so that Ember offered the player an unorthodox perspective on a human problem, but also the agency to help the human character, a fictionalized version of myself,

through a rough period of depression. The game is called *ESA: Emotional Support Animal* and is available on itch.io to play for free (see Figure 1 and Figure 2).

https://mmpress.itch.io/esa

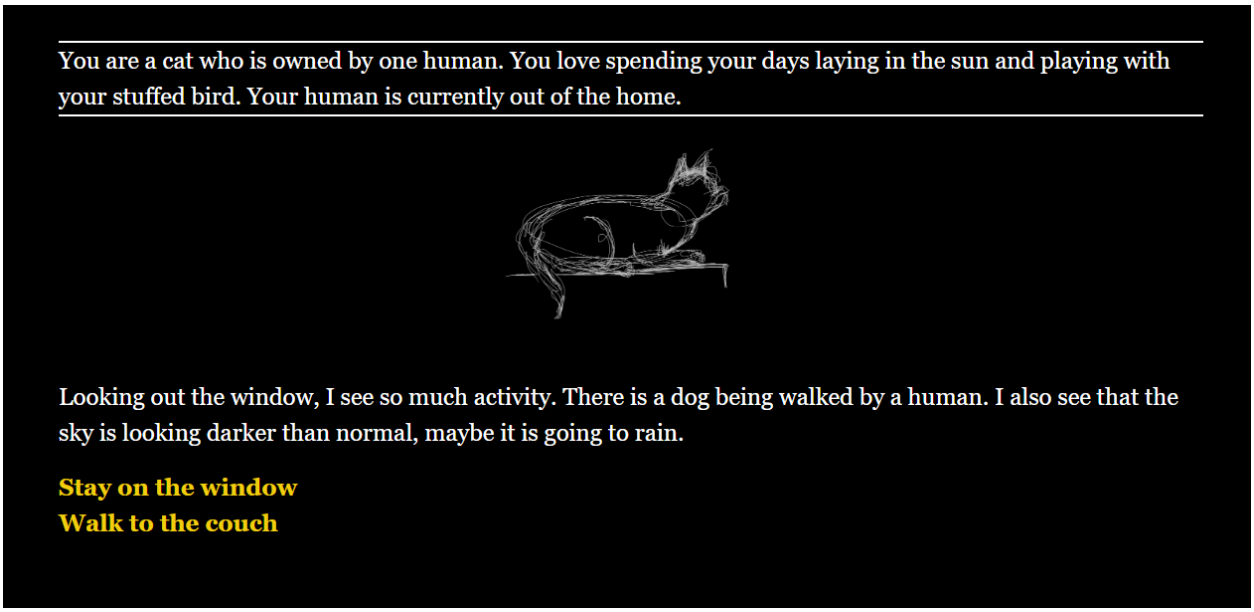

Figure 1: ESA Gameplay

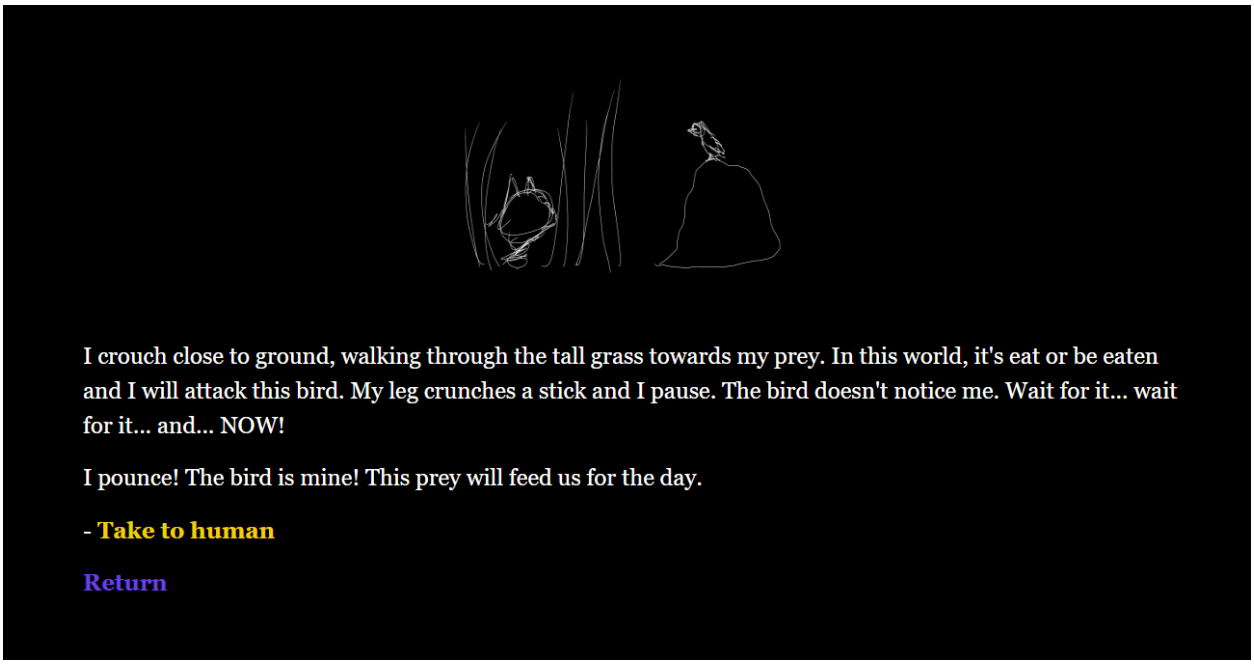

Figure 2: ESA Gameplay pt 2

My final significant experience with video games includes the small personal projects that I have made while working on my degree in Computer Science. While the program does not include any specific game centered courses, game prototypes have been a popular way for me to learn and experiment with new programming languages. During my time at the University of Southern Mississippi, I have created many miniature games in the C++, C#, and JavaScript languages for both assignments and individual growth. These games, considered prototypes, are small exercises and are not fully polished. They typically are short showcases of game mechanics rather than gameplay itself.

Video games are a unique medium that has allowed me to understand the experiential gap between myself and others—the feeling that I often have that I am playing a different game with different rules. While rules are arguably the shared element of all games, different games are designed and played by different rules. In *Rules of Play*, Zimmerman and Salen argue that games are a system and that those systems are designed for a quantifiable outcome (Tekinbas, 2003). This simple logic has allowed me to experiment with games as a tool for personal and scholarly growth. With or without words, games allow me to create situations in which I can reflect on my struggles, think about them from the perspective of mechanics, and create unique problems and experiences for players that are typically absent in ordinary games. They can also convert these experiences into academic objects of study and research. Through game mechanics, I can mimic the feelings of growing up in a world where everyone around me seemed like they had a hidden rulebook that told them how to act and what to say. Video games add a level of immersion and interaction that other traditional mediums cannot always afford.

They have allowed me to find new ways of expressing my own experience and my unique perspective on the world around me.

CHAPTER II: Process Approach

Definition of Terms

Game Prototype: A game in the developmental stage that is a showcase of game mechanics.

Element: A manipulable object within the game prototype. Any object that is used for the purpose of progressing the game or creating an action.

Asset: Any visual, audio, and interactable item within the game prototype.

Iteration: Video game version with the most recent changes applied to it.

Action: Something that triggers an event.

Event: Action that causes a change in the game state.

Game State: The current scene the game is in during playing.

Developmental Model

As a Computer Science major, my undergraduate studies have focused on the action of coding and the design of software. The former is performed using code and syntax, the latter using diagrams and models. In software development, a developmental model is a diagram that describes stages of the code process. There are many different developmental models, but this project will focus on the Waterfall model and Boehm's spiral life-cycle model, two of the most common. Both models are sequential processes that show the development of software in phases (Adenowo, 2013). This section provides a better understanding of both methods, as well as the adaptations I made to my own model of development for this project. Given my tendency to learn more effectively when using visual references, I decided to adapt a developmental model to my needs.

The waterfall methodology is based on sequential steps where each phase represents a different part of the developmental process: analysis, design, implementation, testing, and maintenance (Adenowo, 2020). Each stage is visited once and cannot be revisited. This means that requirements during each stage must be completed in full before moving onto the next stage, rules that set the conditions for a sequential process of design (see Figure 3).

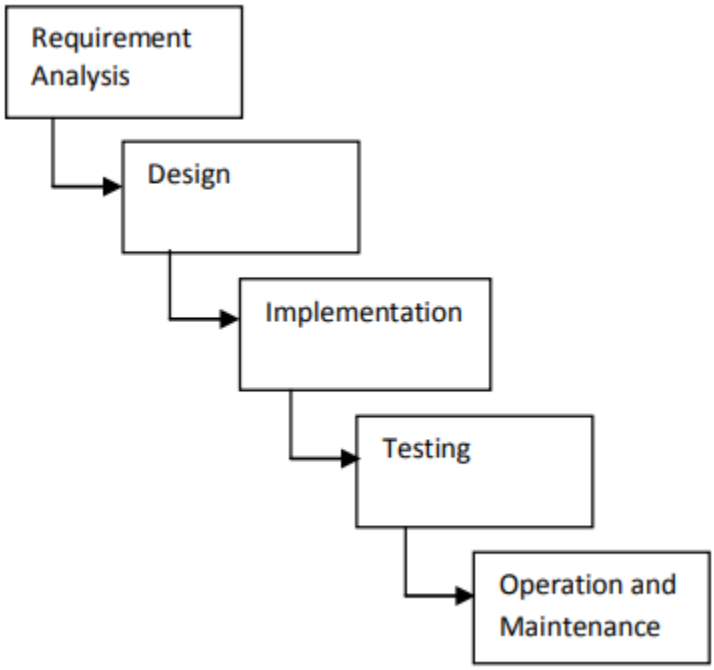

Figure 3. The Waterfall Model

The Spiral Model, on the other hand, is an iterative-based methodology that allows for the changing of requirements during the developmental process. The phases in this model include: planning, risk analysis, development, and evaluation (Badiru, 2019). As Figure 2 (Ruparelia, 2010) shows, this method is significantly more detailed and planned out than the Waterfall model.

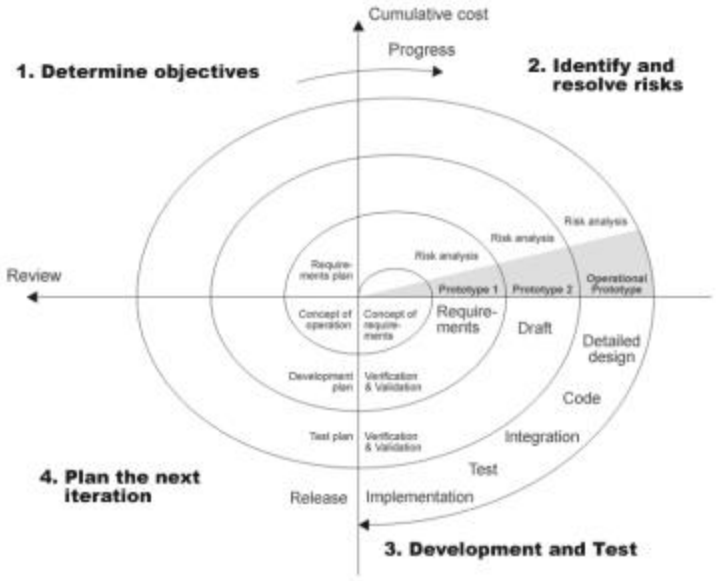

Figure 4. Boehm's Spiral life-cycle

Based on both the Waterfall and Spiral developmental method used by software engineers, I created a developmental model to serve as my methodology for creating my game prototypes. Each cycle of the loop was based on individual elements that were then developed within the prototypes. Elements in this scope were defined as any manipulatable object or feature that could be used to convey a message or feeling to the audience. In what follows, I include a brief description of my developmental model (see Figure 5) and its respective stages.

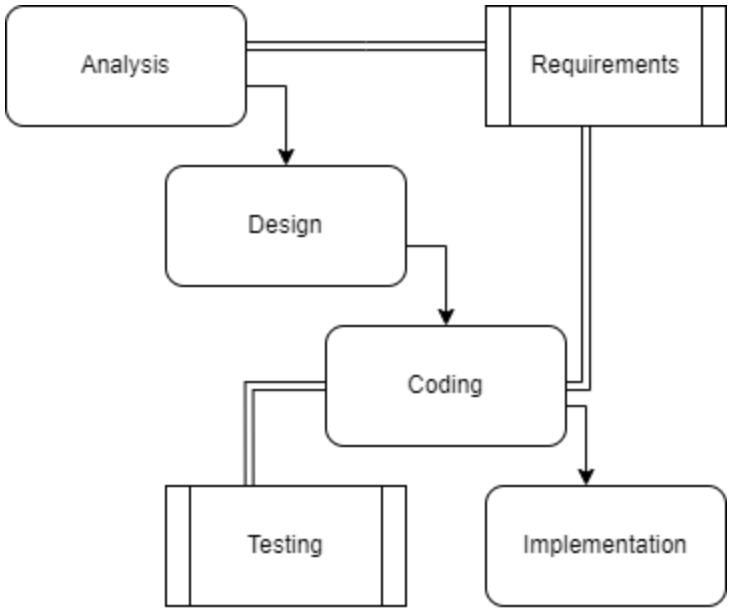

Figure 5. Personal Developmental Model

The first step, Analysis, included research and critical thinking about elements and the underlying meaning behind them. It included any background source and tool gathering and an outline of the element and what the importance of that addition was to the project. After the element was conceptualized, the project then moved into the next step of the iteration.

The Design step took what was discussed in the analysis and translated it into a form that could be created and manipulated. This involved designing each element by giving it a virtual attribute and general placement in the project. For elements that have visual designs, this step included the art drafting, virtualization, and addition into the game engine. The main tools used for this step were the paper to draft out the setup and a drawing tablet to add it into the project.

The Coding step was the actual act of programming, creating, and illustrating the game prototype. This included the Testing checkpoint. Testing was a vital part of

development and having it as a separate step helped to ensure it was done frequently. While coding is primarily focused on back-end development, testing involved feedback from my advisor, peers, and additional parties about the feel of the game as well as the user experience.

The Requirements checkpoint was a phase where, at the end of creating an element, I revisited the beginning layout and decided if the element was properly done according to the intended reason. If the element overall failed to achieve a positive result or add something to the project, it was scrapped or reworked from the beginning of the cycle. The process then cycled into Analysis yet again, continues to loop until each element was complete.

The final step was Implementation. Here, the created piece was analyzed as a whole project. This step included a detailed description of how each element interacted with each other, not just as individuals. Element documentation was revisited and expanded to include any additional information gained throughout the process. Factors such as the game atmosphere, level of immersion, the general flow of the game progress and timeline, playability within the scale of the project, user experience, and the expected emotional outcomes were recorded in detail during this step.

The use of this developmental model helped each step of the project by giving me a clear goal for the outcome of the stage. As the project continued, I was able to pace myself with each element that needed to be implemented. Additionally, the developmental model aided in giving a clear purpose for each element that was then coded into the prototypes, or mini-games.

Materials/Resources

For this showcase, I relied on two different game engines. A video game engine is a term for the tool used to develop, code, and publish a video game. For this project, the development engines of Twine and Unity were used. Twine is a text-based video game creator that solely focuses on objects that consist of text and tags. Unity is a more advanced, multi-purpose engine that is used to create a range of different video games. Its main two categories are Unity 2D and Unity 3D, both of which were used in the creation of this showcase.

The project designed in Twine utilized a mixture of Twee language—the programming language created by Twine for use within the application—and simple HTML markup to change the visual appearance. These programming languages were then combined with basic script for the game, which included all in-game text. The Unity projects were coded in C#, an object-oriented programming language that is commonly used in game development.

For the visual and design aspects of my prototypes, itch.io, an indie game platform that hosts both games and assets, was used to find and download the game assets as needed. Any further design needs were conducted using Adobe Cloud's creative tools for visual elements.

Hardware needs included storage to hold all game assets and documentation, a drawing tablet capable of connecting to both my laptop and programming desktop, and the desktop central processing unit capable of running Windows 11 and the Unity platform. Additional resources included programming language documentation, reference articles and textbooks about game design or video game creation, and artistic content

licenses for any assets used that were not personally created or required permission of use in the project. Textbooks that proved especially useful during development were Tracy Fullerton's *Game Design Workshop: A Playcentric Approach to Creating Innovative Games* (Fullerton, 2014), which I frequently referenced for its process-based and iterative approach to creating games from the ground up.

CHAPTER III: Mini-Games

Showcase

Communication

Direction

Energy Management

In this section, I introduce and explain the design and development behind the four games in the showcase, including an "Artist Statement" followed by notes on "Design and Development."

Communication

https://mmpress.itch.io/communication

Artist Statement

Communication is a text-based interactive experience where the objective of the player is to traverse a simple text interface. This brief mini-game was meant to mimic the struggles of social communication that neurodivergent people often experience. The player is presented with a prompt and options for selection and asked to choose which path to take. Only one path allows the player to continue; if the choice is incorrect, the player restarts from the beginning. Through trial and error, the game is designed to teach the player the basic rule sets needed to guide them through the frustrating process. The options are set up to mimic typical social rules in a more literal sense while the player must connect the dots to learn how to play. To finish the game, the player must question

their own knowledge about how conversation flows and functions for neurodivergent individuals.

Design & Development

My approach to the design of this mini-game was to focus on the simple interface that was provided by Twine. Twine games are typically story-rich as the text-based style allows for creativity to come from the story itself. However, I wanted to highlight the mechanics behind the restricted interface that could manipulate text. For this reason, I decided to design four small looping text puzzles that do not attempt to hide the solution from the player within convoluted text.

Each puzzle is very straightforward in that the solution is told to the player through the prompt. The twist, however, is that the solution must be thought about in a unique way to properly traverse the mini-game. The player must take the prompts more literally than what they are typically used to. For example, the "read between the lines" prompt requires the player to physically attempt to click on the space between two lines. My main goal with the design of this mini-game was to promote critical thinking in the wake of frustration as the game continues to reset every time the player chooses the wrong option.

The final text puzzle is a set of two pages, one where the player is prompted to type in text and another where the same screen is showing, but the player's typing is automatically done for them. This choice was designed to make the player feel as though anything they type would be considered incorrect and that only the game had the correct answer—a problem that reflects traversing a complicated conversation with little to no ability to understand context and correct responses.

Because Twine is a visual interface, the layout of the mini-game can be seen as simple directional boxes that show each page of the mini-game (see Figure 6). The pages themselves are made up of basic text and Twee language to output each webpage as text.

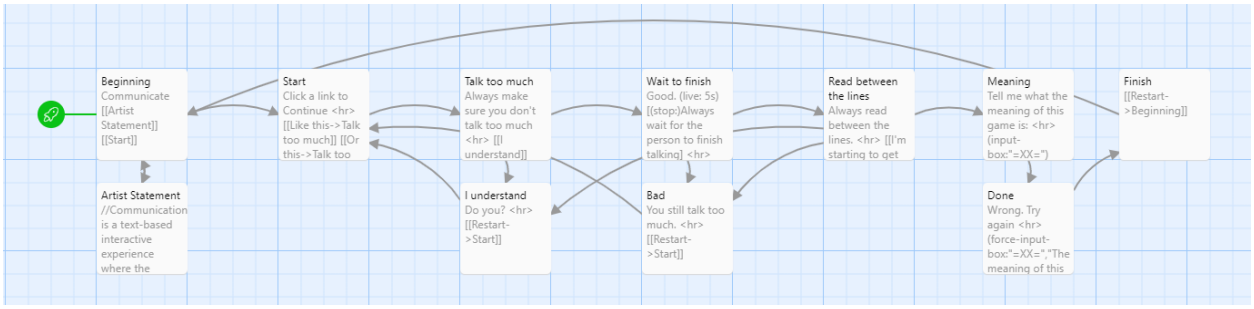

Figure 6: Twine Communication Layout

Overall, *Communication* was a good starting point for my foundation of understanding video game development and the proper use of game design. The simple creation of the mini-game allowed me to experiment with features and interfaces while keeping the structure of the platform easy to follow and build off of.

Direction

https://mmpress.itch.io/direction

Artist Statement

Direction is a 2D platformer that toys with instruction and controls to create a frustrating feeling of helplessness. Within neurodivergent individuals, a helpless feeling could be caused when approaching a new or difficult situation without proper guidance. To reflect this feeling, the game gives very little instruction, only a small “Help” button in the top rightmost corner that briefly tells the player what buttons are used to move. The goal is to traverse the small map and collect cherries, which then trigger changes to the

controls, producing confusion and helplessness in the player. This mini-game showcases the gap between rule/instruction and successful action, particularly in cases where the directions are limited and confusing. To complete the game, the player must learn to accommodate the odd controls while learning that rules do not always translate to successful actions.

Design & Development

My main goal for *Direction* was to create an overwhelmingly frustrated feeling in the player while they play. The way I did that was by changing the controls as the player progresses in the mini-game. The beginning starts off with the traditional controls that most games follow via keyboard input. As the player collects the cherry sprites around the map, the controls change across the keyboard, with each being a more difficult combination of inputs. The only guidance the player gets is the small "help" button in the top right corner. If the player clicks on this button, the instructions briefly pop up and then go away after a couple of seconds.

I designed the mini-game like this to have the player in a constant state of confusion that leads to frustration. I wanted to mimic the way that rules or instructions often seem simple but can quickly become convoluted to neurodivergent individuals in the process of completion.

I wanted the feel of the game to be like an ordinary platformer without any visual surprises (see Figure 7). I played around with a free asset set on the Unity store to find a good layout that would be fun but not too difficult to traverse. The sprites for the cherries and character are all animated with the Unity animation tools.

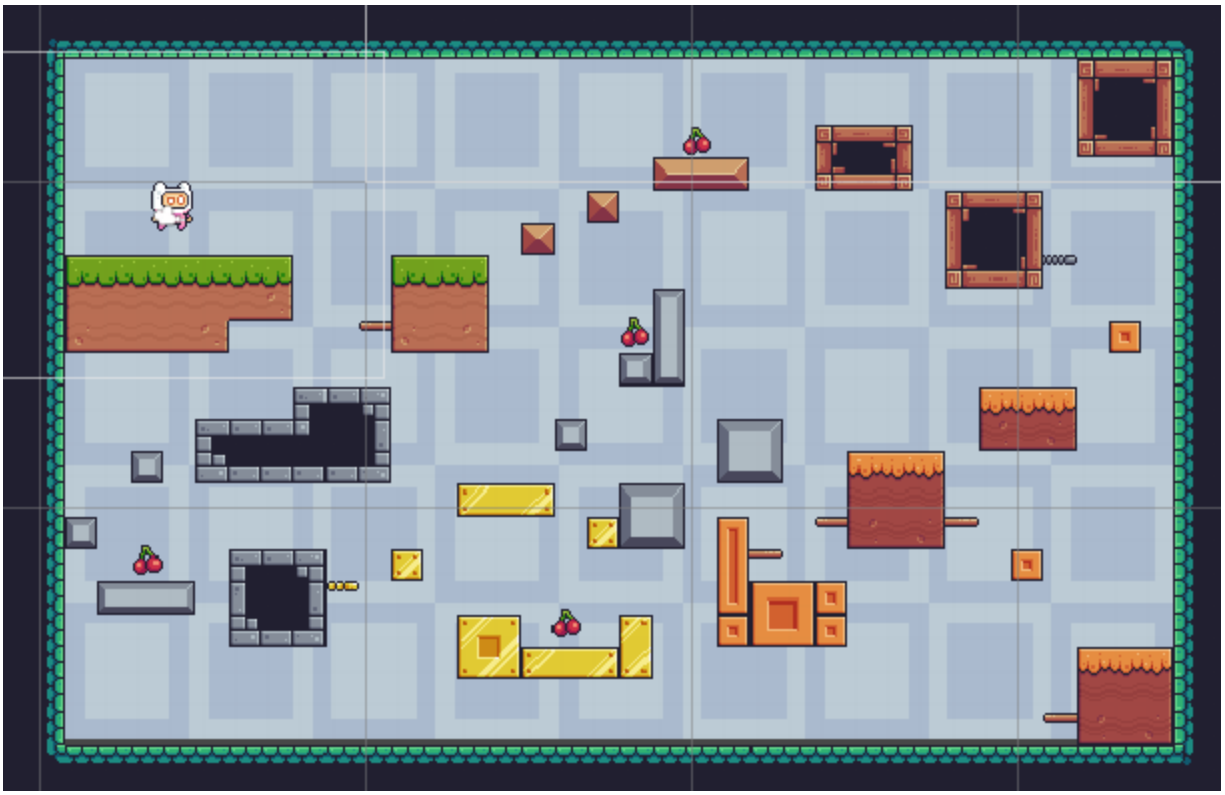

Figure 7: Game Map

For the development of the mini-game, I had to code the character to respond to the inputs, collect sprites, do the proper animations, and switch control sets. In Figure 8, the code to control the movement of the player is shown. The switch case is the part of the code that tells the system what inputs to accept in relation to the player sprite moving.

```
//Checks and Implements the Player Controller
switch (Controller)
{
    case 0:
        dirX = Input.GetAxis("DefaultMovement");
        break;
    case 1:
        dirX = Input.GetAxis("Alternative1");
        break;
    case 2:
        dirX = Input.GetAxis("Alternative2");
        break;
    case 3:
        dirX = Input.GetAxis("Alternative3");
        break;
    case 4:
        dirX = Input.GetAxis("DefaultMovement");
        break;
}

//Sets the Player Speed
rb.velocity = new Vector2(dirX * moveSpeed, rb.velocity.y);

//Controls the Player Jumping
if (Input.GetKey("space") && IsGrounded())
{
    rb.velocity = new Vector2(rb.velocity.x, jumpSpeed);
}
```

Figure 8: Code to control Movement

Figure 9 shows the code for the cherry sprite when collected by the character. The code triggers each time the player sprite collides with a cherry sprite; it checks for collision and then destroys the cherry sprite. The controller is then told that the code needs to move to the next set of inputs to accept instruction for movement. This causes the player to have to change controls after each cherry is picked up.

```
//Controls the deletion of the cheery when collected
private void OnTriggerEnter2D(Collider2D collision)
{
    if (collision.gameObject.CompareTag("Cherry"))
    {
        Destroy(collision.gameObject); //this deletes the cherry
        incrementController(); //this updates the controls
    }
}
```

Figure 9: Code when Player collects Cherry

Direction was a good introduction to how platformers work on the developmental side of game design. I was able to use Unity to code and implement the desired outcome of the mini-game.

Energy Management

https://mmpress.itch.io/energy-management

Artist Statement

In this point-and-click interactive experience, the player must go through a simulated day while juggling an energy bar and a health bar. This mini-game was designed to mimic the struggle of keeping up with daily chores, responsibilities, and activities while being held back by the limits of a neurodivergent headspace. Each iteration starts with the same options presented to the player: tasks that the player can choose to pass the time and progress the game. The exact values of the task and energy bar are not revealed to the player, forcing them to play blindly and attempt to stay healthy while the energy bar rapidly decreases. To complete the game, players must complete tasks while struggling with fluctuating levels of energy and health, an experience analogous to that of neurodivergent individuals.

Design & Development

For this mini-game, I tried to mimic in abstract form the struggle of handling limited energy levels. The simple prototype is designed to make the player manage their energy and health bars while doing typical daily tasks. If either bar runs out, the game is over and the player must try again. This game was influenced by my personal experience

of running out of energy throughout the day and being unable to continue without a reset of my senses.

The bars for energy and health were created in photoshop. They fill and empty depending on the value of each task. The tasks are linked to the bars through code and Unity “On Click” logic scripts. Figure 10 shows the logic behind both increasing the score and the availability of each option. When an object is clicked to interact with, the screen pauses so that no interference happens. After an option is clicked, the menu with the options disappears and the energy levels are adjusted using the code in Figure 11.

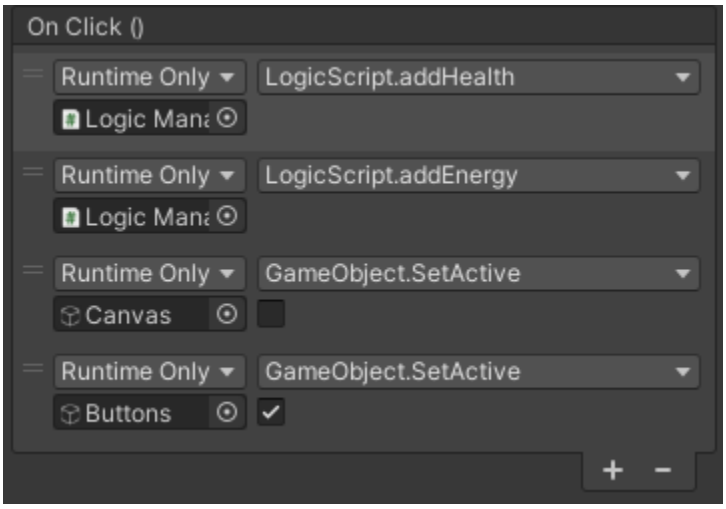

Figure 10: Unity Logic for each Option

```
public void addHealth()
{
    if (playerHealth < 5)
        ++playerHealth;
}
public void removeHealth()
{
    if (playerHealth > 0)
        --playerHealth;
}
public void addEnergy()
{
    if (playerEnergy < 5)
        ++playerEnergy;
}
public void removeEnergy()
{
    if (playerEnergy > 0)
        --playerEnergy;
}
```

Figure 11: Code for Changing Energy and Health

The development of the option choices was done with daily tasks in mind. They encompass things needing to be done each day, such as sleeping, taking out trash, and studying. Each option has a different energy and health price, some positive and others negative. This was designed to mirror, in the form of abstract game mechanics, how daily tasks can be taxing to neurodivergent individuals.

CHAPTER IV: Conclusion

Limitations

Upon reflection, the strengths and possibilities of game design as a critical and scholarly practice were also met with some limitations. The main limitation was the time necessary to complete the project. Working on the mini-games takes both time and effort to create playable experiences for the users. Having less than a year to work on the mini-games and the scholarly paper made it difficult to budget my time between different tasks, which ultimately impacted the length of each prototype. I originally planned to flesh out each idea much more than I was able to do. While the thesis taught me about the scholarly rewards of game design, it also reminded me why most games are designed and authored by teams, not individuals.

Due to the personal nature of the project, I was the only source of neurodivergent experiences. Although the mini-games reflect my perspective on the struggles that neurodivergent individuals encounter, this does not encompass all the unique experiences had by the community. This means that my thesis cannot be considered representative of all neurodivergent experiences. Additionally, my personal experiences are a limitation within itself, as it was difficult to distance myself from the project. With the topic at hand, I had to use my own personal struggles and create mechanics that mimic them, creating a challenging situation to traverse objectively.

Future Research

As a continuation of this project, I would love to update each mini-game to add more content for the user to go through. From a design standpoint, I think each project would benefit from slightly more content. I also would like to address other issues that I was unable to encompass with this showcase. For example, the difficulty of handling social relationships is a common issue with individuals with autism and ADHD. If I were to create a mini-game touching on this topic I would create a small dating simulator but instead of flirty messages, they would be hard to decipher with even less options to choose from than normal games.

Due to the limitation of time, I was unable to complete my fourth proposed mini-game, *Sensory Overload*. The game was going to use the 3D version of Unity to showcase various sensory complications faced by neurodivergent individuals. Utilizing three dimensions, the game was conceived as an experiment using first-person perspective, one that created empathy for those who experience light overexposure, sound sensitivity, and spatial disorientation. My idea was to create a small room with sound and lighting triggers hidden throughout it. From there, the player would have traversed the room like a walking simulator. The only input from the player would have been their movement and occasional interaction with objects.

If completed in the future, *Sensory Overload* would be an amazing continuation to this showcase because it would highlight issues of embodiment and sensory sensitivity that text-based and 2D games often struggle to simulate.

Final Thoughts

This showcase of mini-games is a source of pride for a number of different reasons. First, it allowed me to think through the relation between game design and scholarly practice; second, it further developed my skills in coding and game design; third, it helped me to reflect on the strengths and limitations of game development as a scholarly exercise; and finally, it empowered me to explore and share some common qualities of the neurodivergent experience. If my showcase helps one person to better understand how it feels to have autism or ADHD, then I would say its purpose has been fulfilled; and since it has stretched my own thinking, I feel confident in what I have designed. Each mini-game, although still only a prototype, accurately depicts a common struggle that I have experienced in my own life. In playing these games, I hope that others too gain a deeper understanding of neurodivergent experiences and the unique challenges they can create in a person's life.

REFERENCES

Adenowo, A. A., & Adenowo, B. A. (2013). Software engineering methodologies: a review of the waterfall model and object-oriented approach. *International Journal of Scientific & Engineering Research*, *4*(7), 427-434.

Adenowo, A., & Adenowo, B. (2020). Software Engineering Methodologies: A Review of the Waterfall Model and Object- Oriented Approach. *International Journal of Scientific and Engineering Research*, *4*, 427–434.

Arise: A Simple Story [Video Game]. (2019). Piccolo Studio.

Badiru, A. B. (2019). Waterfall model, V-model, spiral model, and other SE models. *Systems Engineering Models*, 129–138. https://doi.org/10.1201/b22519-7

Belman, J., & Flanagan, M. (2010). Designing games to foster empathy. *International Journal of Cognitive Technology*, 15(1), 11.

Coltrain, J., & Ramsay, S. (2019). Can Video Games Be Humanities Scholarship? In M. K. Gold & L. F. Klein (Eds.), *Debates in the Digital Humanities 2019* (pp. 36–45). University of Minnesota Press. https://doi.org/10.5749/j.ctvg251hk.6

Flanagan, M. (2013). *Critical Play: Radical Game Design*. MIT Press.

Fullerton, T. (2014). *Game design workshop: a playcentric approach to creating innovative games*. CRC press.

Jagoda, P. (2020). *Experimental Games: Critique, Play, and Design in the Age of Gamification*. University of Chicago Press.

Martell, C. (Ed.). (2014). *Advances in game design and development research*. Nova Publishers.

MEd, N. B., MD, & MD, J. F. (2021, November 23). *What is neurodiversity?* Harvard Health. https://www.health.harvard.edu/blog/what-is-neurodiversity-202111232645

Pope, L. (2013). *Papers, Please* [Video Game]. 2909 LLC.

Ruberg, B. (2020). Empathy and its alternatives: Deconstructing the rhetoric of "empathy" in video games. *Communication, Culture & Critique*, 13(1), 54-71.

Ruparelia, N. B. (2010). Software development lifecycle models. *ACM SIGSOFT Software Engineering Notes*, *35*(3), 8–13. https://doi.org/10.1145/1764810.1764814

Tekinbas, K. S., & Zimmerman, E. (2003). *Rules of play: Game design fundamentals*. MIT press.