Frinci and Rosie: Applications of Creative Technologies and
the Layered Tetrad in Co-operative Platformer Play

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This report will discuss the three layers of the layered tetrad, inscribed, dynamic, and cultural and dives into each of its components; narrative, mechanics, aesthetics, and technology. Additionally, the report will briefly touch on the cultural impact of Frinci and Rosie. Moreover, examining the game developers' goals for themselves as well as the design goals for the users. Paper prototyping was discussed in depth as well as key visual examples. Game test data was included as well as personal comments from the game developers. Then expanding into a quantitative analysis of game balancing and game feedback. Player guidance was described in both its direct and indirect forms. Finally, the report will touch on how a VR adoption may occur and how one may monetize the game.

KEYWORDS: cooperative, platformer, layered tetrad

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1 INTRODUCTION

Frinci and Rosie have been developed to integrate stunning inscribed visuals, fluid mechanics and well-written code. It follows the correct patterns for dynamics so that each player's game experience is unique and inclusive to the larger population. The community around this game will be drawn to its customizable features and help to add more accessibility to the game. Frinci and Rosie is a game meant to show society that teamwork is what is needed for anyone to achieve their goals in life, even if you may be working with your mortal enemy. Our goal for this game was to draw on our personal connection to relate to the users while also giving them a unique sense of fun playing the game. Paper prototyping was a key asset in game design and helped the developers optimize the player's game paths. Extensive testing was conducted in several rings of the testing layers so the game could operate bug-free. Additionally, a quantitative analysis of game balancing and game feedback was conducted. Player guidance was described in both its direct and indirect forms as well as how the game would be adapted to VR and monetized. Overall Frinci and Rosie is a game to exemplify all of the design principles of the layered tetrad.

2 LAYERED TETRAD

This section will discuss the three fundamental layers of the layered tetrad (inscribed, dynamic, and cultural) through the lenses of the four elements (mechanics, aesthetics, narrative, and technology).

2.1 Inscribed Layer

2.1.1 Mechanics

In terms of Inscribed mechanics, there are several different considerations, namely seven different aspects which will be discussed in this section. The seven aspects are objectives, player relationships, rules, boundaries, resources, spaces and tables.

Firstly, Objectives can be rationalized as goals and are characterized by short-, medium-, and long-term time frames. Objectives are very important as stated in this paper "Designers have to provide a way to identify, synthesize and implement critical goals, which allows for transforming and engaging the interaction sequence" [5]. Beginning with short-term goals we can see that the player wants to immediately advance to the next block, the next section, or maybe the next platform to reach the end. Mid-term goals are to overcome one of the threats (such as swimming through water), defeat one of the enemies, or collect additional threats. Their long-term goal is for both pets to reach the end of the level by reaching their respective bowls, along with advancing to the next level. Objectives are what keep the player interested in the game, and give something to always work towards.

Secondly, player relations are how players compete for and collaborate to complete the objectives of the game. In Frinci and Rosie, we can have both a protagonist and a collaborator style. Since the game is multiplayer there is a sense of collaboration working with the second player who would be in control of the other character to reach the end of the level. This is because both characters must reach the end of the level to move forward. The game is also geared towards the protagonist type because the player must reach the end of the level in a sense conquering each level by level defeating enemies and obstacles that may come in their way. It is hard to know how different players will react to the game so this research paper urges designers to "take advantage of previous research that has been conducted on player types. In user-oriented approaches, users appear as more concrete actors that can be called to validate, test and inform in certain phases of the project" [3].

Thirdly, Rules are the unwritten boundaries of the game that limit the player's actions; the two types of rules are explicit or implicit. In Frinci and Rosie, we see many examples of explicit rules; such as both characters must reach their bowls at the end for the level to progress, and Frinci is unable to overcome water tiles. An implicit rule would be the paths that each pet must choose; for example, Frinci will be encouraged to choose paths void of water and vacuums, while Rosie chooses paths void of ghosts.

Fourthly, Boundaries are the physical space and time constraints of the game in Frinci and Rosie space constraints are the dimensions of your screen as each platformer level is made to stretch to the edges of your screen. There are wall blocks with collisions embedded into them all around the edges and there are floor blocks along the floor to indicate that it is the edge of the level. Players can only play inside collisions of the outside walls, this rule prevents them from falling off the map. In terms of time, there is no time constraint inscribed in this game; but the time it takes a player to complete a level is

tracked and thus a tracking system is implemented in the game, but it does not affect gameplay.

Fifthly, In terms of resources in Frinci and Rosie, there are two types, assets and attributes. There are many assets in the game, such as the cat (Frinci), the dog (Rosie), bones, ghosts, vacuums, water tubs, climbing walls, along with many others. The assets do not only have one component, there are variations of the assets themselves with small changes that are used to create animations within the game. Additional assets that are static and do not affect the gameplay are the static blocks and boxes that are used for the background wall and floor tiles which fall under the definition of platform building blocks. Attributes are numbers representing values within the game. For example, the dog bone value is dynamically adjusted as the pets collect more bones throughout the level. Another example is the time value that is tracked on each level, it is used at the end of a level to inform the players of the time taken to complete.

Sixthly, inscribed spaces there is one major inscribed space in Frinci and Rosie, the level itself. The level is used to create a flow of movement from beginning to end via the platform block. Additionally, the level has built-in landmarks and experiences via the entities provided. The level will change as you progress in the game with additional entities and a changing platform scheme. The movement across the level stems from a bottom-up approach; you start at the bottom and continue to move up towards the pet's bowls. The game experience may fluctuate based on the level layout and the objective (bowl) position.

Finally, tables are often used to calculate probability, track progression, and collect playtest data. Tables were used for all three use cases, but the most relevant use case for this section is the progression; the progression table was used to validate that the levels get linearly more difficult by assigning a numerical value to each of the entities present in the level. A simplified example of this is level one has an entity difficulty of ten, level two has an entity difficulty of twenty, and level three has an entity difficulty of thirty.

2.1.2 Aesthetics

Now discussing inscribed aesthetics; in plain terms, this means how one experiences the game through the five human senses: sight, hearing, touch, taste and smell. The two main senses that Frinci and Rosie have an impact on are sight and hearing, thus they have been implemented into the game. Touch, smell, and taste have not been implemented but can be derived through the other senses, an example of this is seeing the fluffy pets in the game and "feeling" the fluffiness through an imaginary touch.

In terms of visuals, there are many different aspects. These aspects include not only the art but also the formatting and consistency across the game levels. The first example is how sprites or the characters keep consistent art across each level. This is done so the players of Frinci and Rosie know that the behaviour of each character has not inherently changed between levels. The way Rosie looks in level one is the same way she looks in level two. The game also keeps consistent visuals across static blocks and entities that may hurt the pets; thus the characters know that if they jump on a box they will not get hurt whereas if they jump in a tub of water they may drown. Finally, we chose a specific art-style approach to visuals due to the research we conducted. Pixeled was chosen due to "many excellent teams and independent developers have adopted the pixel art style and produced amazing works at low cost." This sounded exactly like

our project, a low-budget project, yet we wanted to create amazing results. [1]

Another aspect is colouring for distinction, an example of this in the game is how the main menu and the game end menu are different colours. This is used to indicate to the user which menu they are in and what state they will return to when they click resume/restart. For the main menu they would jump into level 1 whereas, in the game over menu, the game only gives the option to quit or return to the main menu. The reason the colour distinction is important is because the font and visual style of the menus are otherwise the same; thus could lead to user confusion.

The hearing element was implemented in two ways. The first is background music, there is background music for the main gameplay as well as different music for all of the menus. For example, the game lost menu has a sad tone while the game won menu has a happy tone. There are also sound effects, on the players jumping and attacking this helps the players know what action they are taking. There is also a select audio effect on all menu buttons so users know they click on a button registered with the game.

2.1.3 Narrative

The inscribed narrative is made up of the dramatic elements of the game that were designed to make the game more interesting and engaging to the audience. The four main components of narrative are premise, setting, character, and plot.

For premise, Frinci and Rosie are a cat and a dog that live together, one day their bag of treats goes missing and they must work together to get their treats back. It was important to keep a unified theme in the game to immerse the player; this was to encourage an emotional connection. An important piece of research stated "To create an emotional experience, every component in a game should work together for a unified theme" This unified theme keeps a player distracted and engulfed by the fictional world they find themselves in. [2]

The setting takes place in a haunted domestic household where usually the two mortal enemies are forced to cohabitate. This setting is a driving force for the entities of a ghost, vacuum, and water.

There are two main characters in the dramatic elements of our story, the cat, Frinci, and the dog, Rosie. Both of these characters are protagonists who are forced to work together and collaborate to win the game while exploring the narrative arc of getting all their treats back. There are two other entities in this game which may be considered enemies. They are the ghosts and the vacuums. which the pets are afraid of. Rosie is afraid of the ghosts while Frinci is afraid of the vacuums.

The plot of the game as mentioned and discussed above can be broken down into simple terms. The pets have lost their treats and they must work together collecting treats by threat level by level to get them all back.

Traditional dramatics have a consistent story arc, thus, Frinci and Rosie followed Gustav Freytag's five-act structure which involves exposition, rising action, climax, falling action, and resolution. The exposition is the same as the setting and the premise. For rising action, the pets must run through the house collecting treats. The climax is the very last level when the pets have completed all the treats, and reach their final bowls. The falling action is the cutscene at the game which indicates the wrap-up of the story and how the pets have completed collecting all of the treats and can finally be happy.

There are two types of narratives, the first is interactive and the second is linear,

our game has aspects of both types of narratives. The linear aspect comes from the already set story from beginning to end. A user can see the elements of that in Frinci and Rosie where in the beginning they lose their treats and at the end they get them back, linearly from start to finish. There is also a strong element of an interactive narrative through free. Free will allows the characters to collect treats through a self-chosen path, and thus they can decide the outcome of their own game; more specifically the outcome of each level.

The reason one would want to have inscribed narratives in the game is to evoke emotion, to give players motivation, and a form of justification. It is often used to have a common sense of progression and a reward system as well it serves to reinforce other mechanics in the game. Every person who has a pet can tell you how much they love them; cats and dogs are the two most common household pets, by playing those two characters most people are likely to build an emotional connection with them. It allows them to express themselves which is a key component according to this research article it states that "Expression comes from dynamics that encourage individual users to leave their mark" [4].

This emotional connection urges the player to consider that teamwork can benefit them in real life, this idea of mutual work towards a goal is the true message of Frinci and Rosie. In terms of motivation and justification, players justify killing enemies by their motivation to get treats and finish the level. The game plays into progression and rewards; as they progress throughout the level they get closer and closer to their goal of a full treat bag. The inscribed narrative and visuals play hand in hand to reinforce the actions of the players. For example, the visual of the treat as well as the narrative element reinforces that the treats are an object that the players want to collect.

2.1.4 Technology

Finally moving onto inscribed technology; which is the actual scripting, modelling, and building of the game. There are several trackers throughout the game in the form of variables such as current level, treats collected, and action and state booleans. The state booleans are used for level progression which are triggered once the pets reach their respective bowls. Many other variables keep track of whether or not characters are within the play area or whether entities are in their respective hitboxes. We use simple algorithms to decide if a character should be taking damage, and if so the amount of damage. Once a level end occurs the tracked variables mentioned above would be used to display stats in the level end menu, as of right now not all stats are displayed to not overload the user.

There are a few variables which are passed onto the next level to continue level progression; such as the treat counter. There are a multitude of important features, for example, there is a feature to save the player's level progress so when they come back to the game and continue playing from where they left off. This makes the game more enjoyable and does not force long gaming sessions that may not be possible for everyone. This is a very common load and save feature used in many other games; thus it was implemented into Frinci and Rosie.

2.2 Dynamic Layer

The dynamic layer is the parts of the game that create meanings and

interpretations of the game itself. This is a shift that takes place when the player is playing the game. Essentially, it is how the player experiences the game during its runtime operation.

2.2.1 Mechanics

There are 6 fundamental aspects to dynamic mechanics. These aspects are procedures, meaningful play, strategy, house rules, player intent, and outcome.

To begin with, procedures are the actions taken by the players during the play of the game. These are actions that aren't necessarily described by rules within the game but are rules prescribed by the users themselves. An example of this would be players determining whether Frinci or Rosie gets to move to reach their bowl, more specifically who is leading and who is following that level.

The second aspect is meaningful play, it comes from user actions. An example of such actions is using the keyboard to control the characters creating a meaningful impact on the gameplay. This is what separates a game from a simple video. The actions you take influence the outcome of the level. In Frinci and Rosie, this is done through the use of free-moving characters throughout the level so that people are free to move about the level and find out what each of the game mechanics is. Meaningful play means the action should be discernible so the character can tell the action did something; when one presses left in the game, one of the pets will move left, right, up, or down. This means that the actions have a direct impact on the outcome of the game. So for example, if a user were to move Frinci, right into a water tub, it would drown, and thus the user would love the level this one one way in which the games integrates discernible actions.

The third aspect of dynamic mechanics is strategy, this is plans or game style made up by the player to win the level or get to their end goal. Frinici and Rrosie enable strategy by again being a free-roaming level design and extremely different character abilities. The user is free to pick their strategy to get to the top the fastest or pick their strategy to get the most treats as possible.

The fourth aspect of dynamic mechanics is house rules; these are rules that users may make small modifications to as compared to the prescribed rules. An example of this could be the players must collect all bones in one level to move forward to the next; kind of like a completionist game style.

The fifth aspect of dynamic mechanics is player intent. There are four types of players which are Achiever, Explorer, Socializer, and Killer. The game style in Frinci and Rosie is geared towards all of them except for Killer. An achiever can achieve the completion of the levels and explore their designs. The explorer can roam around and find out what each of the traps does. Finally, the socializer gets a partner to collaborate with to win the level or to explore together.

Finally, the last element of dynamic mechanics is outcomes; these are similar to inscribed outcomes; but they are broken down into three categories: immediate, cumulative, and final. Immediate outcomes are when a character interacts with an enemy and risks ending the level at that moment. An example of cumulative outcomes would be the threats that accumulate over time. The final type of outcome is in each level in the form of whether or not both pets made it to their bowls or died along the way. Current behaviour from what the developers have observed is that most people are achievers and just trying to learn the game mechanics so no house rules or player intent is strongly

shown. There is also not a lot of strategy among test users but they did appreciate the animations to indicate whether or not the character was attacking or not.

2.2.2 Aesthetics

Dynamic aesthetics include animations on the characters which mirror the character's actions. For example, when the Rosie is attacking it plays the attack animation, when the Frinci is climbing it plays the climbing animation. These animations remain consistent which means when the Rosie barks it looks like it is barking, when the Frinci scratches a scratch animation is played. This is done every single time to inform the player of the current state of certain actions.

Another component of dynamic aesthetics is the environment in which the game is played. Each player will play this game in a different environment, some may play alone in their bedrooms or others may play with people or in public areas, the dynamic factors in these situations are the lighting, screen resolution, and perspective of the viewer. For example, if the game is played outside during a sunny day the screen will be very hard to see as the glare and the brightness of the sun will impact visibility. Frinci and Rosie is designed with a high baseline brightness and the background is a light tan colour; these two actions are done to attempt to alleviate any issues with changing environments.

The characters and the platform components are contrasting colours; for example, Rosie, Frinci or water tubs contrast. If a contracting colour was not possible, the assets were then outlined in a layer of black pixels such as the ghost and vacuum. This outlining is used to help those suffering from colour blindness as they rely mostly on contrast to delineate shapes. This also helps users who may have low screen resolutions as the characters are designed in a pixelated art style. If the player plays in a noisy environment it may diminish their experience, thus simple to hear and distinguish music tracks were used. On the other hand, the noise could positively contribute to their experience, for example, a family member cheering them when they defeat an enemy.

Currently, the game aesthetics are appreciated among the test users and the game is visually appealing to all. The contrasting colours helped the users play in a brightly lit room.

2.2.3 Narrative

In terms of dynamic fiction, there are two aspects, one being interactive fiction and one being emergent fiction. Interactive fiction is how the story changes based on player choices. In Finici and Rosie, the narrative outcomes depend on whether the player makes it to the end of each level. If they fail, the story ends without a satisfying conclusion. The emergent narrative is the player's experience of playing the game. There are a few different scenarios, there is a scenario where the player finds it very difficult to pass each level and spends a lot of time mastering the game. In another scenario, the player may pass all levels in one go. The aspect of a cooperative game is impactful to the experience of the player, it shifts whether they play it with another person controlling the other character. All of these scenarios paint different personal narratives depending on how each person experiences the game. From testing the current dynamic fiction leans towards emergent where the user's experience with the game shapes their view of

the story.

2.2.4 Technology

Dynamic technology includes the runtime behaviour of the game. This includes the execution of the code, Frinci and Rosie were designed and thoroughly tested so that there are no runtime errors that will crash the game. The game code is designed so that it is lightweight and can run on computers with very little processing power meaning that a larger audience has access to the game. Finally, a very rudimentary form of artificial intelligence was used on the enemies to make sure that they did not fall off the play area, or leave the area they were assigned to. During playtesting, the game ran smoothly, and the current AI level was hard enough for beginner players.

2.3 Cultural Layer

2.3.1 Mechanics

Cultural mechanics involve game mods and custom levels. One of the reasons the game was built in Godot was due to its simple gaming architecture built for beginners; so those who would like to modify the game will have an easier time at it. The developers of Frinci and Rosie imagine that many different mods will be made; for example. a mod could be made to modify the ghosts by giving them different abilities so that defeating them is harder/easier. The game players will create mods that will promote the game within society.

2.3.2 Aesthetics

Game mods could be aesthetic, the player could create new skins for the pets or even give the pets human skins, making the game feel a lot more unpleasant due to a human jumping on all fours. In terms of level design, the player may want to configure the level blocks to their choosing, making the game environment have a creepier, or happier aesthetic feel. The game players will create game art to be appreciated by society at large and possibly convince some new people to play.

2.3.3 Narrative

There are two aspects to cultural narrative fan fiction and machinima. The developers of Frinci and Rosie imagine that the players will create fan fiction stories about the two main characters Frinci and Rosie either directly related to the narrative in the game (of getting their treats back); or could be the two characters in extremely different scenarios. An interesting example could be a story where Frinci and Rosie have grown up to start a family and have weird hybrid babies that need to be saved from a dragon.

Machinima is where fans use a game engine to tell their own story. In this game, the developers imagine people with a cat and a dog acting out their pets' behaviour as that would be more relatable to them; in a way bringing their real-life pets into the video game universe.

The game player will spread these stories within their communities and they will eventually become ingrained in society at large, possibly becoming a mainstream game.

2.3.4 Technology

For cultural technology, a screen reader would be useful to the players of the game if they have a visual disability. There may be a development of path-finding game mods that also help those with visual impairments. Another piece of adaptive technology could be eye tracking linked to player movement for a hands-free gaming experience; or in the future, use devices such as Neuralink to play the game and control the character simultaneously. Game players will do the adapting so that members of society at large can come and enjoy the game.

2.3.5 Cultural Impact

In terms of cultural impact, the game will have a positive impact on society as it will spread the message of cooperation; people will understand the benefit of teamwork and thus will incorporate a stronger teamwork mindset into their daily lives. There could be a negative cultural impact with players getting the impression that all dogs and all cats get along. This would have a negative cultural impact because if those two animals are placed in the room without proper training, or are adopted by the same family they will likely fight each other and get hurt.

3 DESIGN GOALS

Frinci and Rosie is a game in the cooperative platformer genre. The platformer genre is a game genre where characters jump from one platform to another encountering objects, obstacles and enemies until they reach the objective of the level. The cooperative aspect stems from the requirement of two characters (usually two players) having to work together to solve a level and reach the objective. The larger genre of this game is action, which is usually a fast-paced game where one must complete an objective after passing through some enemies or obstructions. Frinci and Rosie are platformers because the pets must jump from one platform to the next to defeat enemies like vacuums and robots and must navigate obstacles like heights and water pools to get to the end.

The motivations for this game were a few different factors. It is designed as a casual game geared towards people who have pets or children. Our motivation is the fact that one of us has a cat and the other a dog and we wanted to create a game involving them. We took inspiration from Watergirl and Fireboy, a two-character platformer. The game is meant to convey the message that two animals often depicted as enemies can work together toward a common goal. In this case, the goal is for them to get their treats back, but only one pet can't navigate the boxes of the storage room. The motivation is to teach anyone but specifically children about the benefits of teamwork and cooperation in accomplishing their goals.

3.1 Designer-Centric Goals

Firstly, community. There is a strong sense of community caused by building this game. We did not get a chance to interact with game developers in the 2D platformer community, but we did get a chance to build community among our classmates who are also building games. For example, we got to interact with others who are using Godot and ask them questions about the game engine. Community is a very important aspect

for game developers as it allows them to throw ideas between each other and it helps the community stay up to date on any new developments; for example, when Unity changed its terms of service to attempt to extort large amounts of money from independent game developers.

Secondly, personal expression. This game was a personal expression of the love of our pets. We are relaying to the audience that pets have unique personalities and that these personalities might interact in very interesting ways with one another. The developers also like to play casual games in their spare time and since the game Fireboy and Watergirl was extremely popular during our childhoods we decided to put a wholesome spin on it.

Lastly, becoming a better designer. Designing a game from scratch has helped us become better designers in the process. It was our first time using Godot and for one of us, it was our first time making any game at all. We achieved the goal of becoming better designers by learning Godot and creating a 2D game from start to finish; unlike many other groups, we also created all of our pixelated assets (with inspiration) instead of just downloading royalty-free content.

3.2 Player-Centric Goals

Firstly, fun. Fun in a game could mean either enjoyable, engaging, or fulfilling. The game is designed to be fun in all of these aspects but focuses on the fulfilling element. We believe this game fulfills the player's need for socialization because this game is a cooperative game meant to be played with two people. The game also is considered engaging because it provides some level of challenge to the player, the increasing difficulty makes each level interesting to play.

Secondly, flow. Flow is the golden spot between the average player's skill and the amount of challenge in each level. A good level of flow causes the player to focus and embed themselves in the game while making the levels reasonably easy to solve. flow is responsible for keeping and holding the player's attention. Frinci and Rosie is geared towards those who have less of a skill set for platformers meaning that a player will not get bored as there is a fair amount of challenge in the game. However, someone who plays platformers competitively may not fall into the same sense of flow as their peers with fewer skills. The game is not targeting avid competitive players.

Thirdly, attention and involvement. The gameplay of Frinci and Rosie is meant to catch the player's attention with bright colours and moving enemies. The game is meant to hold this attention only for a little bit, enough to retain the attention for a few levels. Which is why it deploys visual interest rather than a long and complex narrative. The complex two-player mechanics are also a feature designed to hold the interest of the player as either one or both players must master the pet's movements to win the game, and a player would not want to quit prematurely if their teammate needs them.

Lastly, Interesting Decisions. Frinci and Rosie are built on the premise that interesting paths require interesting decisions. Decisions such as whether or not Frinci should climb the wall or try to defeat the vacuum first. These decisions have an impact on the game outcome which makes them interesting. The decisions are also ambiguous, whichever path Frinci or Rosie chooses they will not know if it is correct until they either die or reach the end of the level.

4 PAPER PROTOTYPING

4.1 Paper Prototyping Tools

Several paper prototyping tools were used, the main two were a large sheet of paper and a tablet-powered whiteboard. The large sheet of paper was used for the final drafts of the paper prototyping as the paper is a little less forgiving than the whiteboard, but, a paper is a lot more reliable since the designs cannot be easily rubbed off. The whiteboard was used for all initial drafts, since the whiteboard was digital and on a tablet it also allowed us to draft with colours to delineate different elements. The tablet allows for faster mistake correction as opposed to a paper and pencil as there is an undo/redo feature. Regardless both are mediums for prototyping that were used within the project. Paper prototyping was used initially for idea generation, after the genre of a 2D platformer was settled on, prototyping moved to the tablet.

The process for paper prototyping was first to prototype all of the characters such as Frinci the cat and Rosie the dog, then the enemies of the ghost and the vacuum, as well as the water tub. The final step in the whiteboard prototyping was to implement the level designs and where the objects should be placed. Action prototyping and path prototyping where the analysis of the characters' paths through the prototyped levels.

An important aspect of the game that was "prototyped" in 2D was the animations for Frinci and Rosie; this took place as we would encourage the pets to perform the action that needed to be studied in the game as we drew it. For example, we had Rosie jump up and down from the couch as we attempted to draw and now down the shape of her body as she was in the air for the jumping animations; a similar approach was taken for the other animations of the pets.

4.2 Paper Prototype Example

An example of paper prototyping in Frinci and Rosie was the level sequence storyboard diagram. This sequence can be seen in Figures 1-6 as the sequence illustrates the first level and how the two characters may move through the level and end up at the bowls. This prototype was made in the whiteboard software on the tablet only taking around a minute per figure and allowed for fast changes based on what we felt was appropriate in the game. For example, an earlier draft had a vacuum next to the bone on the left-hand side, but we decided to remove that on the mock paper playthrough as it would make the prototype too hard for a tutorial level, thus it was removed; we wanted to focus on modelling the behaviour of a level with no external enemies present. More changes were made from these initial prototypes such as menu design, the prototypes in Figures 1-6 are meant for a more generalized idea of the game rather than exact details.
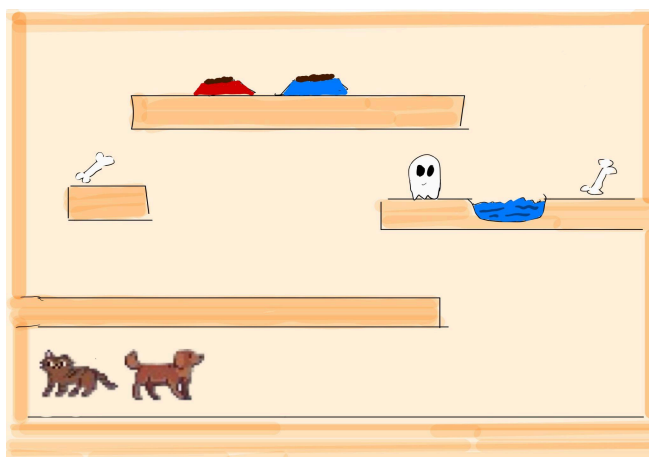
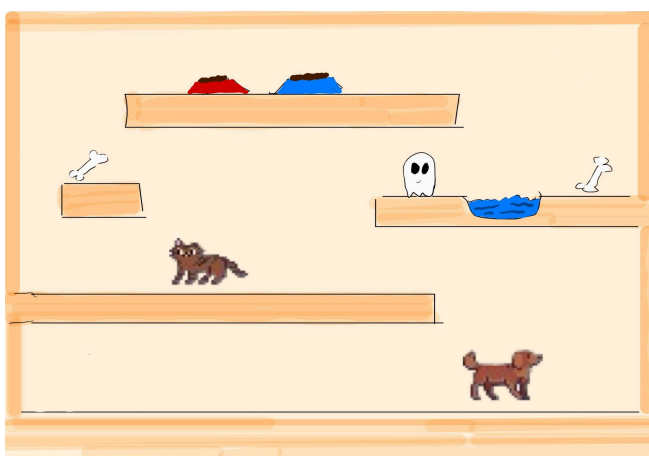Fig. 1. Tutorial Level Paper Prototype Scene 1
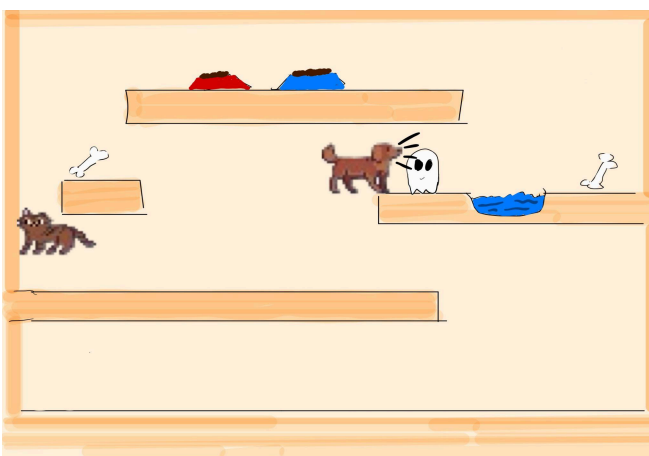

Fig. 2. Tutorial Level Paper Prototype Scene 2
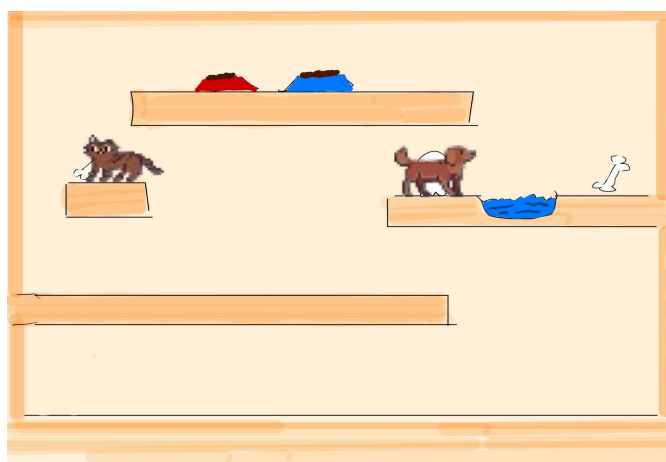

Fig. 3. Tutorial Level Paper Prototype Scene 3

Fig. 4. Tutorial Level Paper Prototype Scene 4

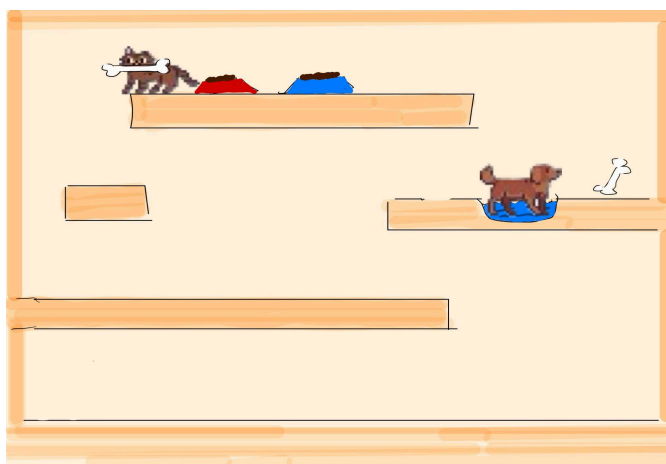
Fig. 5. Tutorial Level Paper Prototype Scene 5

Fig. 6. Tutorial Level Paper Prototype Scene 6

4.3 Prototype Player Movement

Prototyping player movement through space was crucial for Frinci and Rosie as there are many paths to the end and different combinations of moves each character could make. The method of prototyping that was used was to create paper prototypes of the bare essentials of the levels including only the platform blocks and the level end points. These bare essentials were drawn in blue and white, this is sue to the fact that the only interaction the pets have with these elements is to use them as floor tiles, they do not hurt or help Frinci and Rosie and therefore are neutral when it comes to path balancing.

From there the cat and dog paths were drawn in red and blue lines respectively. Then the enemies were represented as orange shapes and the special abilities such as the water tubs and climbable walls were represented as green shapes. Finally, the optimal paths (if a player's goal was to avoid enemies) were charted in yellow for Frinci and purple for Rosie. These paths revealed that there may be some imbalance within the game, which is what makes prototypes like these an asset in the first place. For example, in Figure 13 for level three it can be seen that the cat always encounters 4 enemies while the dog encounters just 3. This imbalance could be solved by the removal of one of the cat's enemies or adding extra treats to the cat's path to make the extra challenge worth it.

4.4 GUI Mock-Ups

GUI (graphical user interface) mockups are a key aspect of game design and prototyping. The GUI prototypes give us a visual of key functionality and enable paper prototype testing with users. For example, in a test of the main menu as seen in Figure 7, there are three button options: "new game", "load game", and "quit."

it would be helpful to see if the playtesters tend to press "new game" or "load game" on their first run. If the number of new players pressing the load game is proportionally high then the developers may consider removing the button until a save file is present or adding additional information to inform the user of the button's functionality.

Additionally, the treat counter as pictured in Figure 9 is important to prototype as there are many options for placement and art. It was decided to go with a transparent background with a counter and treat icon to indicate to the user that their treat count is going up or down. The GUI mockup of the initial instructions as seen in Figure 10 was helpful as it outlined the space needed for user instructions, it was decided to use icons for the keyboard keys to give a visual aid to users and save on-screen space.

As a user is playing our game they will see a very strong resemblance of various components outlined in this section to the actual components that were implemented in the game. It is important to note that none of the components were perfectly implemented, in most cases there were sizing, colour, or feature adjustments that were highlighted with further play testing and overall aesthetic appeal. This is due to the simple fact that a drawn game will never look the same once it is implemented in code.
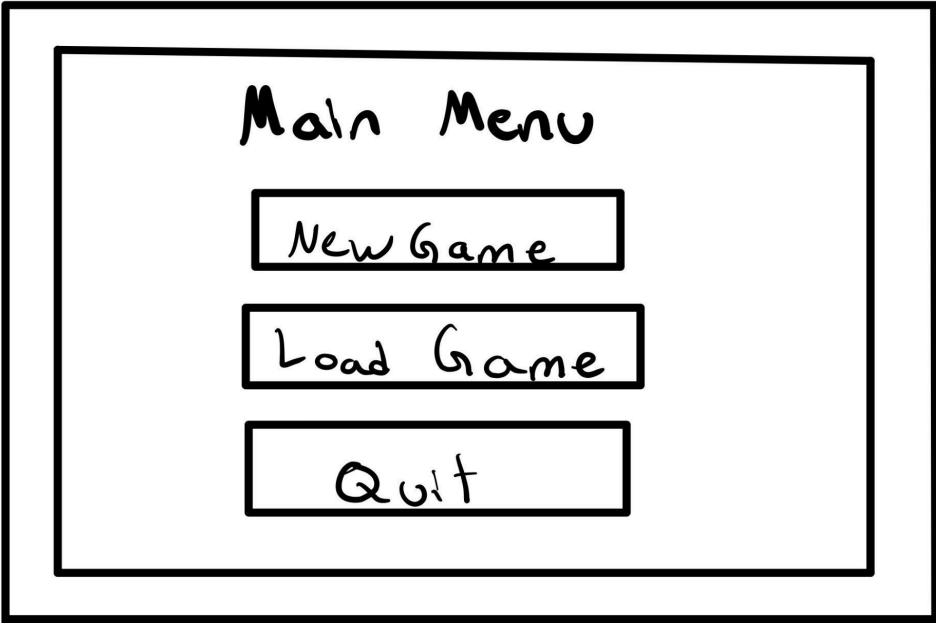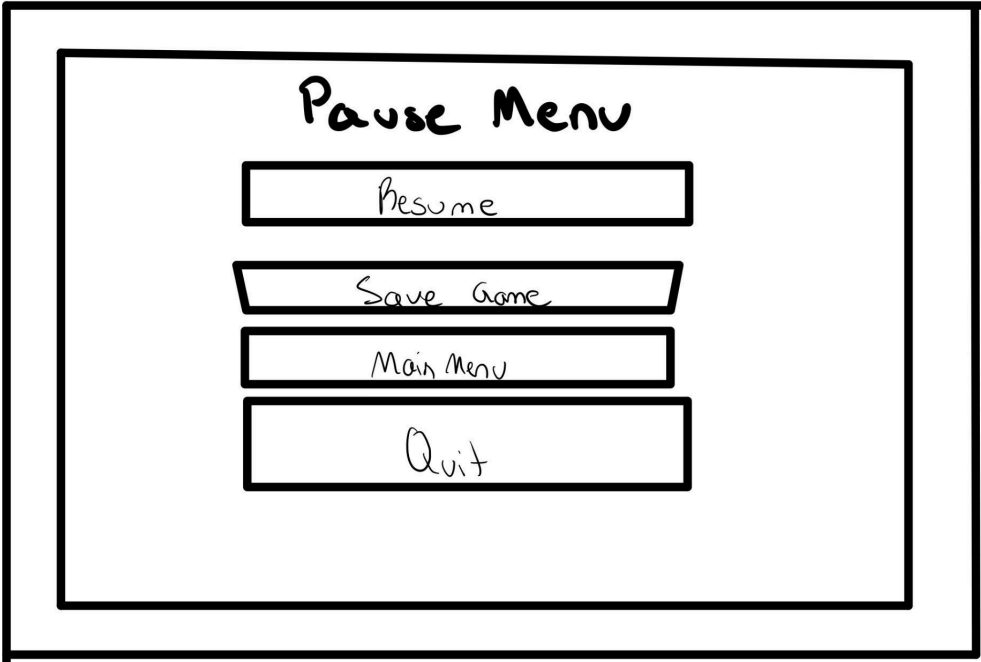
Fig. 7. GUI Mockup #1 - Main Menu
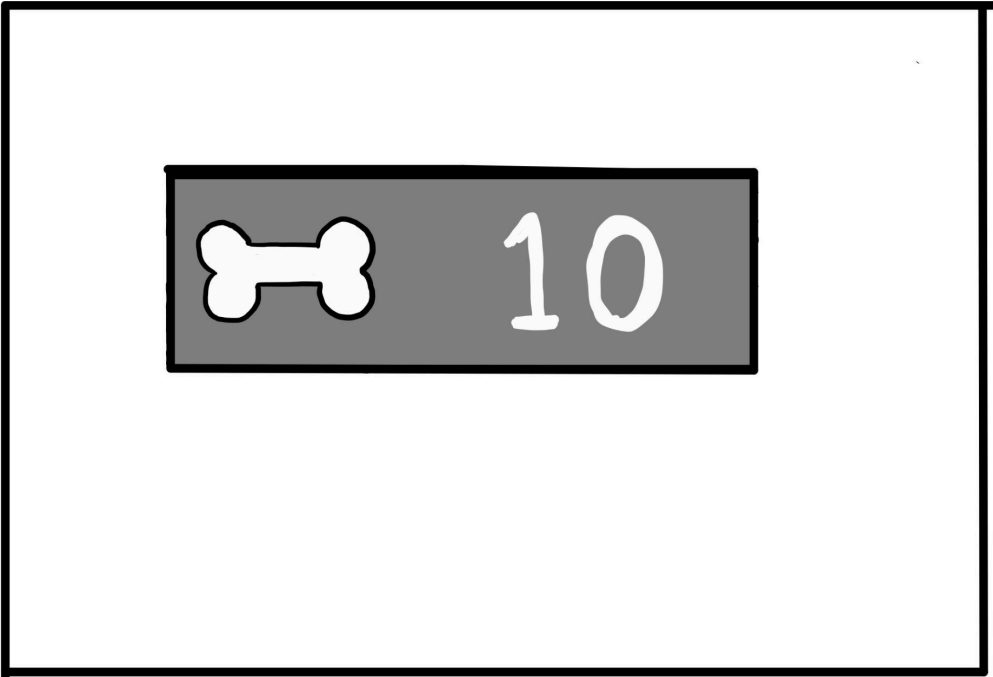

Fig. 8. GUI Mockup #2 - Pause Menu

Fig. 9. GUI Mockup #3 - Treat Counter

Instructions

1. The Dog moves with ↑ ↓ ← → keys
2. The Cat moves with W A S D keys
3. The Dog jumps with Space and barks with Shift
4. The cat jumps with E and climbs with W, and scratches with Q
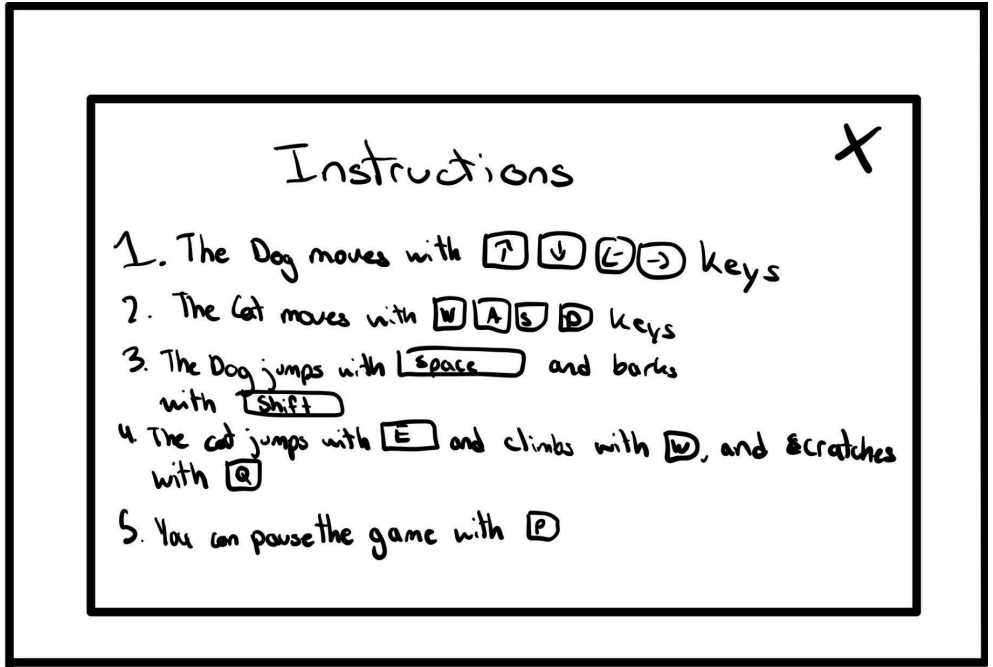5. You can pause the game with P

Fig. 10. GUI Mockup #4 - Instruction Pop-up

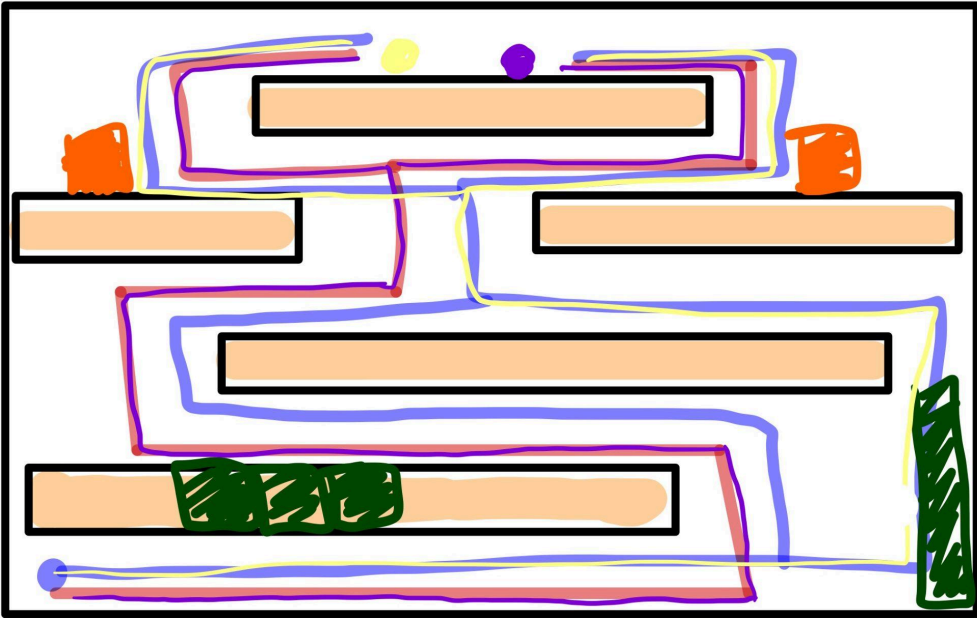Fig. 11. Path Prototype - Level 1

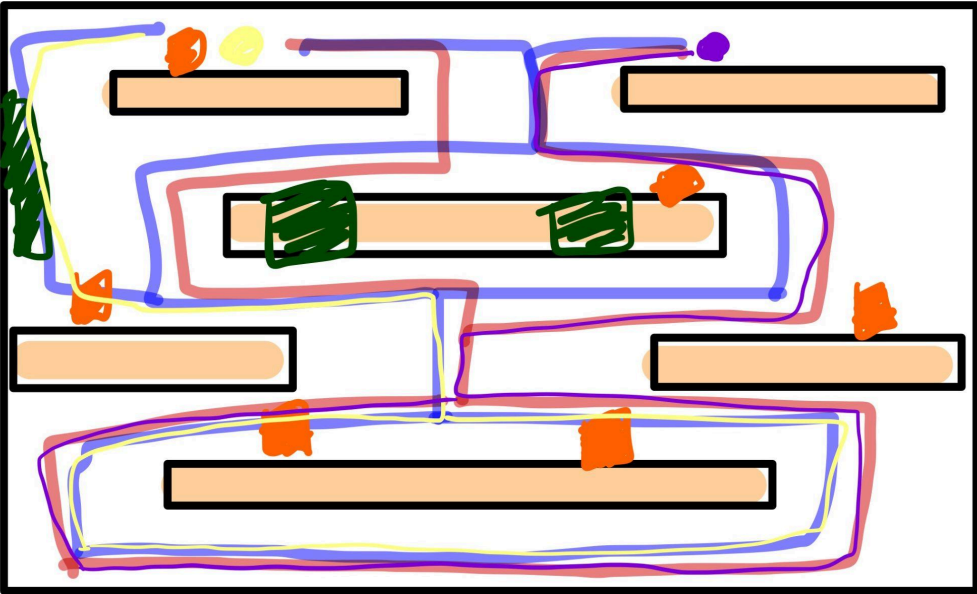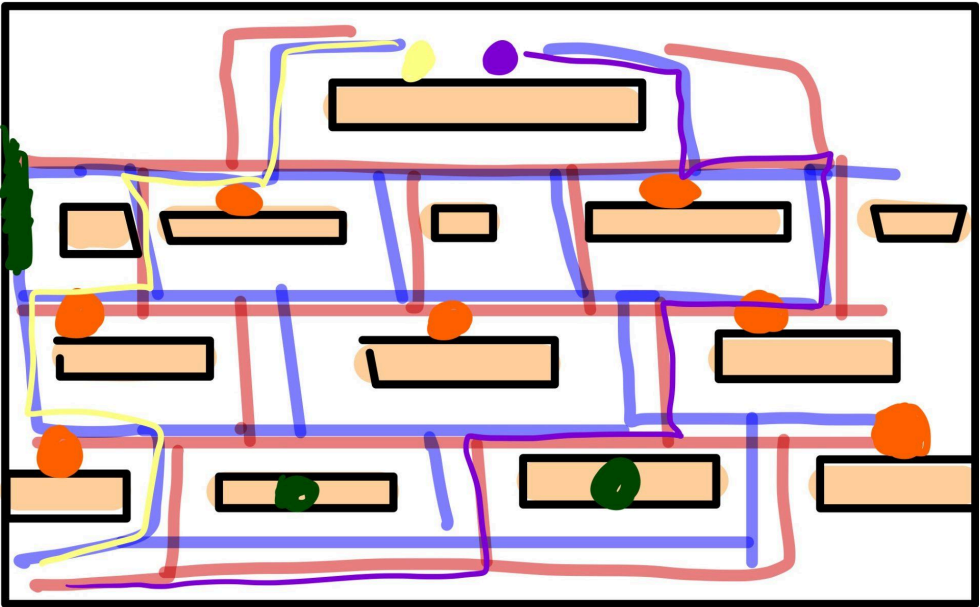Fig. 12. Path Prototype - Level 2

Fig. 13. Path Prototype - Level 3

5 GAME TESTING (2 PAGES)

5.1 Playtest Yourself

The developers play-tested themselves and came across a few bugs and a few points of improvement. These rounds of playtesting were done early on in the development to improve playability and visuals. There are pictures of the developers playtesting the game in Figure 14 and Figure 15. The notes were as follows. In terms of bugs, there was an issue with animations across both main characters such that the animation only played when the associated key was held down for example the dog jump animation only plays when the spacebar is held down, and the idle animation plays if the space bar is clicked once. The ideal behaviour would be for the animation to play whether or not the spacebar was clicked once or held down. To fix this animation, the logic of the animation player will have to be adjusted From a glance, it looks like the idle animation does not wait for the jump animation to finish playing before it resumes the idle animation, thus the jump animation only plays when the space bar is held down. Another bug was that Frinci and Rosie could both be on the same bowl for the level to end, as in both can be on the dog bowl for example, and the level will progress to the next one. Although this behavior does not detract from the gameplay it would be ideal if the game only advanced when the pets were on their own respective bowls.

For general game improvements, the developers had a few suggestions. The first suggestion was to change the behaviour so that the enemies were defeated by different pets. Before Frinci and Rosie could defeat both the ghost and the vacuum. This would add a layer of strategy and complexity the developers think would be beneficial, to make it so that Rosie the dog is afraid of the ghosts and Frinci the cat is afraid of the vacuum, as most real-life cats are. In the game this translates to the cat not being able to damage the vacuum as he is too scared to attack, meaning he is hopeless against the vacuum all he can do is run away. The same is true about Rosie and the ghost. This forces the players to work more closely together because if there is a vacuum in the Frinci's path Rosie must come clear the path. The game mechanic is meant to make the player think about the path they will take and also what obstacles may be in their teammate's path thus increasing the amount of teamwork needed to win the game.
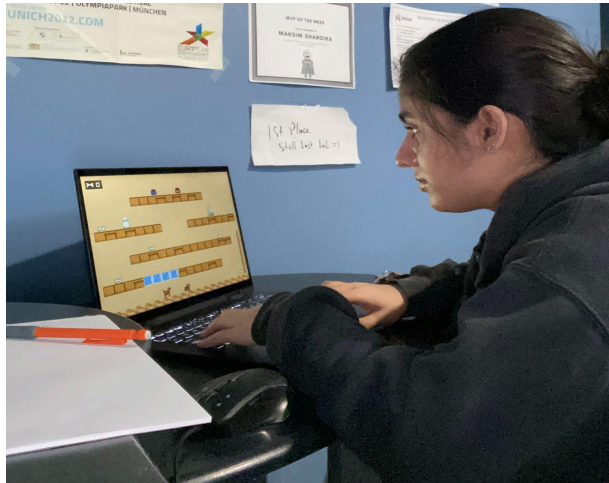
Fig. 14. Game Developer - Simran - Testing Frinci and Rosie

Fig. 15. Game Developer - Maksim - Testing Frinci and Rosie

5.2 Informal Individual Testing

Informal group testing was conducted with close friends of the developers, these friends were sent an executable of the game and asked to provide feedback comments when they got through the gameplay in their own time. They were given minimal instructions but were encouraged to ask questions if they got stuck. They were encouraged to not only report bugs but to also offer suggestions that could improve the game. Their first suggestion was to possibly add cover art to the executable icon as the Godot logo looks a little bit suspicious, they would feel more comfortable opening the executable if it did not have the default cover art. The second suggestion was to add another feature of a moving wall they had seen in other 2D platformers. They would have liked to see a moving wall and pressure plate system where one of the pets would step on the pressure plate to start the wall movement either up or down and the other pet could pass through to the other side. This is an idea the game developers implemented into the game on level 2 and it is meant as another avenue to increase player teamwork

and encourage them to problem-solve to get to the end of the level. The severity was not high due to the fact that these issues did not hinder gameplay but were mere ways to improve the feel of the game.

5.3 Formal Group Testing

Our post-playtest survey will contain these five questions:

Did you encounter any bugs in your playthrough? This is an important question to ask in formal group testing, as the game is meant to be in a finished and playable state before a large group formally tests it. This question is important as the developers know the sequence to get to the end of each level and will follow this sequence when testing but in formal group testing many of the players are seeing the game for the first time so they are more likely to explore the whole level before they reach the end. The players are also more likely to press random buttons on the keyboard or buttons in an unexpected order which would help to reveal bugs.

Did the narrative make sense and engage you? This is a key question to ask in formal group testing as it evaluates the comprehension of the game. Not all platformers have a narrative attached to them so the game could be playable on its own but the user may not understand the underlying narrative and thus not get the whole intended experience of the game.

Did the visuals stay consistent? This question is to encompass all of the player's visual senses and make sure outside of bugs that affect playability the bugs that affect the visuals are caught. Often when we are asked if there is a bug we only consider the technical side, so this question is targeted specifically to catch the visual bugs a user may encounter.

Did the game logically progress? This question is to test both the logic within the levels and how well level difficulty progresses. Within each level, the characters must be able to get from the start to the end logically so if there is an unreachable platform or impossible jump we would want the paytesters to report that. Additionally, we want the playtesters to report if there are issues in playing the game from start to end.

Are there any suggestions for the game? This question is to encourage the devs to look at ideas they might not be able to think of themselves, it is meant to add more fun to the game as opposed to just looking for things that are broken.

5.4 Formal Individual Testing

A formal playtest was conducted on Frinci and Rosie; the video of the player's screen and face cam can be found [here](https://youtu.be/S8syjOWAG6Y)(https://youtu.be/S8syjOWAG6Y) as well as some screenshots of the session are available in Figure 16 and Figure 17. For a summary of suggestions from the players we gathered that the playtester was confused about the keyboard controls, they understood the basic concept of the arrow keys and WASD keys for both character movements but jumping, attacking, and special ability keys were harder to keep track of and the formal individual playtester often forgot which key did which action. The playtester suggested that there should be an instruction screen at the beginning of the level so that new players could easily figure out which keys they need to remember. They also suggested a button that would bring up the pop-up again perhaps in a menu so that the player could go back and reference it. The playtester did find a bug while playtesting which was that the cat could get killed from the water tub

from below which made a jump on one of the levels impossible, so that was a change that was implemented within the game to make that level playable for future playtesters.
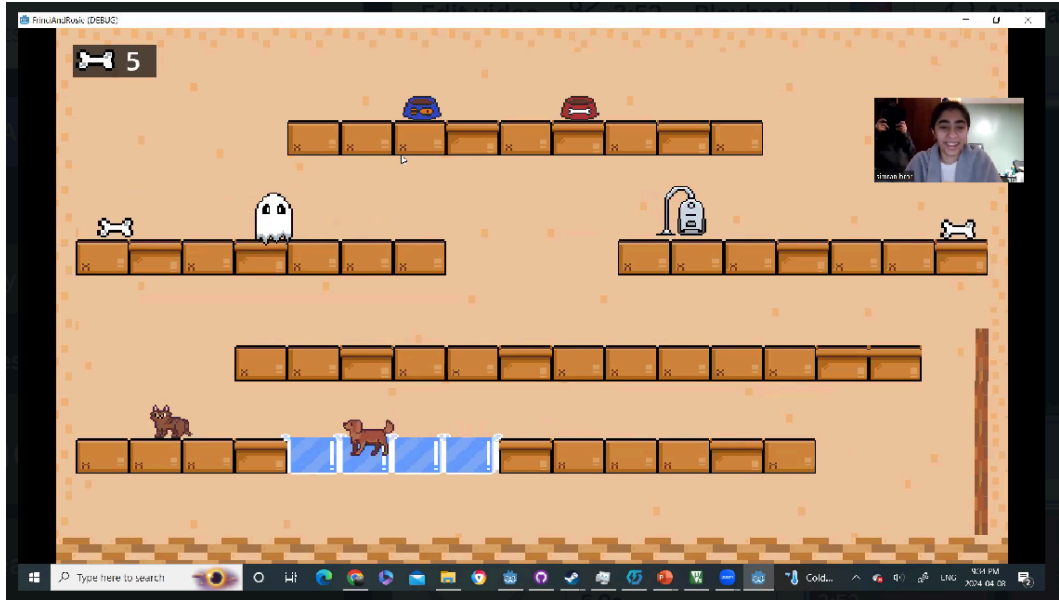

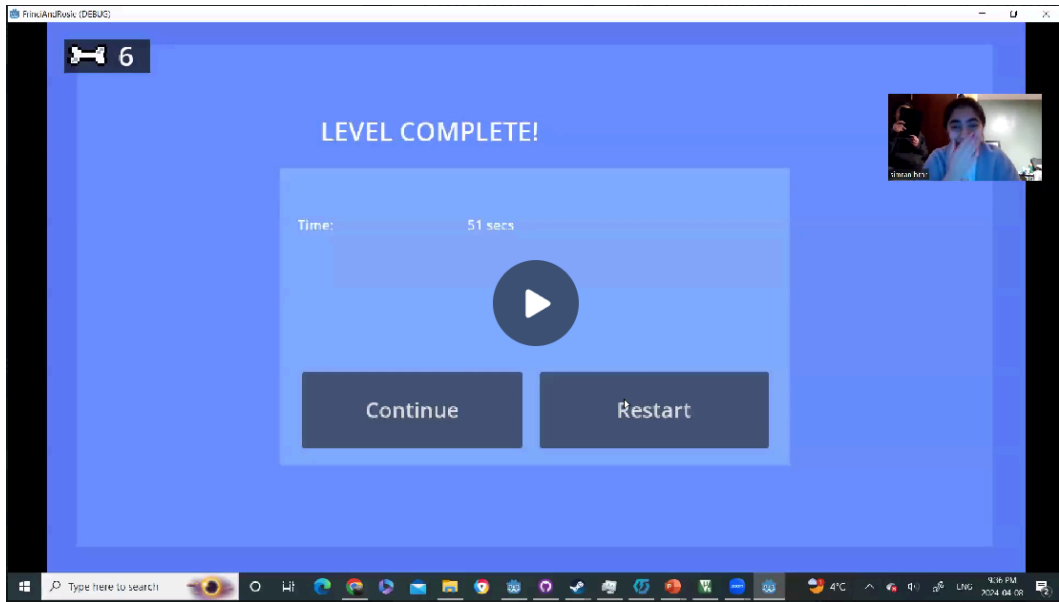Fig. 16. Formal Individual Tester Playing Level 1

Fig. 17. Formal Individual Tester In Level Won Menu

6 GAME BALANCING

6.1 Spreadsheets to Balance Weapons/Abilities

Game balancing is crucial in all games but especially multiplayer games like Frinci and Rosie. We want the player or players to be able to have equal amounts of ability on each character and equal amounts of damage. This does not mean that there are an equal amount of enemies necessarily, it just means the relative level of difficulty should be the same across both players. To achieve this we will use some quantitative analysis on all three levels of Frinci and Rosie to determine whether or not the levels are fair for both characters. Using a quantitative analysis on character balancing is important as often our intuition when it comes to level fairness is not enough, especially the intuition of the game developers because they are so familiar with the game that they do not know what it is like to play through the game the first time.

We created a table per player, per level to analyze the fairness of each level and how the level progression was implemented. To begin with, the cat player we assigned one point for any climbable walls present on the level - a climbable wall allows the cat to climb which is his special ability. For any vacuum cleaners present in the level, the cat was assigned a minus one this is due to the fact that the vacuum cleaner kills Frinci. One point was given per ghost present because Frinci can kill the ghost to help his Rosie out.

These points were then totalled up for each level. For Rosie a similar approach was taken, the dog was awarded one point per water tub as swimming is Rosie's ability. One point was taken away per ghost present and one was awarded for each vacuum cleaner present and these points were also tallied up. The results can be seen in the tables below. For level 1, (Table 1) shows that the totals match so this level is very well balanced. For level 2, (Table 2) shows the totals are off by one point this is due to one extra water tub which gives Rosie a bit of an advantage on level 2 so the game is slightly imbalanced. In level 3 (Table 3) we can see that the totals match so the game is pretty well balanced. To improve level fairness one of the water tubs could be removed from level 2 making the characters balanced again.

For level progression we can see that there is a total of 3 points for the first level, 9 for the next level and 12 for the last level through this point progression indicates more obstacles which would indicate that the levels are progressing appropriately. There is a 6-point gap between the first and second levels and a three-point difference between the second and third levels.

We can also reference the Figures from path prototyping (Figures 11-13) to improve our overall game balancing. The system that was used to decide the most likely path can be also used to determine how fairly the game is balanced. The reason we would want to analyze the path the players are most likely to take is because it may be impossible to balance the game across all paths so the developers should strive to balance the path that most players are going to pick. This could also act as a guidance tool for the players, where the developers purposefully make the game imbalanced the further away the player strays from the correct path. For example, in Figure 13 we can see on the most common path, Frinci encounters more enemies than Rosie, thus the game is imbalanced on that path, but Frinci could follow Rosie up her path and then the game would be equally balanced as Rosie would remove the obstacles preventing Frinci from going up that path.

A probability analysis could be conducted on the levels. For this study, the number of level platform segments was taken into account which can be seen in the second column of Table 4. Then the number of enemies was taken into account. The number of enemies was divided by the number of platforms for each level. The results can be seen in Table 4. The probability of enemy encounter is 0.5 on level 1 which means there are 0.5 enemies per platform segment and the same percent chance of encountering them on any segment. This probability changed to 1 for level 2 and 0.64 for level 3. Probability analysis is important to perform on any game as it illustrates how fair the randomized elements of the game are. If Frinci and Rosie had randomly spawning enemies then it would be important to check that the probability for an enemy for Frinci would be roughly the same as the probability for an enemy for Roise.

Level balancing				
Level 1	Water tub (+1)	Ghost (-1)	Vacuum (+1)	Total
Rosie	1	1	1	1
Level balancing				
Level 1	Vacuum (-1)	Climbable wall (+1)	Ghost(+!)	Total
Frinci	1	1	1	1

Table. 1. Level Balancing Table for Level 1

Level balancing				
Level 2	Water tub (+1)	Ghost (-1)	Vacuum (+1)	Total
Rosie	3	4	2	3
Level balancing				
Level 2	Vacuum (-1)	Climbable wall (-	Ghost(+!)	Total
Frinci	2	2	4	4

Table. 2. Level Balancing Table for Level 2

Level balancing				
Level 3	Water tub (+1)	Ghost (-1)	Vacuum (+1)	Total
Rosie	2	5	5	2
Level balancing				
Level 3	Vacuum (-1)	Climbable wall (+1)	Ghost(+!)	Total
Frinci	5	3	5	2

Table. 3. Level Balancing Table for Level 3

Level	# of platform segments (including floor)	Total enemies	Probability of encountering an enemy per segment (# of enemies/segments)
1	6	3	0.5
2	8	8	1
3	14	9	0.64

Table. 4. Enemy Encounter Probability Table

6.2 Positive and Negative Feedback Systems

Feedback systems are the responses of the game to the player's actions. Feedback systems indicate to the player that the game is actually responding to them. A feedback system could look like a pop-up on the screen indicating the action that a player promoted in the game is the reason for a change in the game's behaviour. For example, in Frinci and Rosie if a character moves one block to the right or one block to the left nothing happens except the visual effect of the character moving over.

Positive feedback systems mean that good things happen more often when a player is doing good, Negative feedback is when a player is doing good in a game the game gets harder for them to play.

In Frinci and Rosie, any overt feedback mechanisms were avoided because it is a multiplayer cooperative game but some forms of built-in feedback loops are positive. This game is meant to encourage the player to win as such the mechanisms are that as the player progresses platform by platform they get closer and closer to the end of the level. There is no action in the game that the player could take to make it harder to reach the end. The only action is if one of the characters dies but this would result in death and the level would restart. It would make the overall game longer and might be perceived as harder by the player.

Possible future improvements for positive feedback include adding a shop feature. The shop would allow players to purchase upgrades for their characters using

the treats they collected. There may even be another type of treat implemented so that Frinci and Rosie can both have their own set of treats. The treats would enable them to purchase items or power-ups from the shop. The items would give them additional abilities; an item may give Frinci the ability to swim. Power-ups would operate the same way but the effects would be temporary but conversely be cheaper to purchase. A power-up may give Rosie the temporary courage to defeat ghosts. Possible negative feedback could be the levels get harder if you lose your treats by dying. Making the game harder could be achieved by adding in more enemies, or even losing some of your special abilities.

7 PLAYER GUIDANCE

7.1 Direct Guidance

Guidance is key within any game, guidance is how one player knows how to get from one part of the game to the next part of the game. Guidance can either be the physical path the character has to follow to advance the game or hints for solving puzzles so the character can advance. For more advanced puzzle games the game designer may not want to have any overt clues as the whole point of the game is to solve the puzzle but for a 2D platformer like Frinci and Rosie that is not the case.

In Frinci and Rosie, there are two types of guidance which are direct and indirect. For direct guidance, we have instructions, calls to action, maps or guidance systems and finally popups. Instructions in the game were two types both mechanical and objective based. For objective-based, the instructions given were to reach the end of the level and to collect as many treats as possible. The other instructions were about which keyboard keys to use to move the pets. For example, for Rosie, the player must use the arrow keys to move side to side, the spacebar to jump, and shift to attack. For Frinci the cat moves with the WASD keys, W key to climb, E key to jump, and Q key to attack. There is also a key to access the pause menu which is the Esc or the P key. These instructions are shown at the beginning of level one in a pop-up and they indicate the basic maneuvers to the player but do not reveal the paths for the users to win each level. Instead, they only provide a basic grasp of the buttons and the resulting movements. For example, the user may not know that the character of the cat moves with weird keys such as the E and Q keys.

There are calls to action within the game. Calls to action are prompts to make the player take a certain action to advance the objective of the game. The calls to action are present as an association with objects. For example, the cat can climb walls so, the call to action is for the cat to climb up the wall when it sees there is a place for him to climb. Similarly, the water tubs are a call to action for the dog to cross them or use them as jumping blocks because it is the dog's special ability. The same thing applies to the enemies, the cat is called to go up the path marked with ghosts while the dog is urged to go up the path with the vacuums.

There is no direct map or guidance system implemented in Frinci and Rosie but the player can see the whole level from the very start allowing them to map out the level in their head and decide on the optimal path.

Finally, there are pop-ups. One of the pop-ups in the game is the instructions pop-up at the very beginning of the game to give the player direct guidance as to what instructions and rules they need to be aware of. There is another type of popup in the

game which is the pause menu pop-up but this pop-up does not offer any direct guidance for the play. The final type of pop-up is for the narrative, where the goals of the game are relayed to the player, they must collect treats and reach their bowls.

We can judge the quality of direct guidance through 4 attributes which are immediacy, scarcity, brevity, and clarity. Immediacy means how soon the direct guidance is delivered, in Frinci and Rosie the guidance of the instructions is delivered immediately in the form of a pop-up at the beginning of the game. Scarcity means that how often direct guidance is given, less direct guidance is better. In Frinci and Rosie, there is only one bit of direct guidance at the start which means it satisfies the scarcity parameter. Brevity and clarity go hand in hand brevity is conciseness and clarity means you convey your meaning. Frinci and Rosie achieves this through a combination of words and sprites in the instructions to provide extra clarity and to cut down on unneeded words.

7.2 Indirect Guidance

There are seven methods of indirect control which are constraints, goals, physical interface, visual design, audio design, player avatar, and non-player characters.

Constraints exist in Frinci and Rosie through the fact that players must reach the top, the most basic of choices that have constraints in the game involves choosing whether to jump up to the right or left platform.

Goals exist in Frinici and Rosie as the objective is to collect all of the bones which lead the papers along a certain path. Additionally, there is the final objective of each level which is to get to the bowl and deposit the treats.

The physical interface of Frinci and Rosie is the keyboard. The player expects to be able to press the arrow keys or the WASD keys to move the characters and it is likely the spacebar will do something for the characters.

Visual design in Frinci and Rosie entails the breadcrumb trail left by the treats; the players are meant to follow the treats to the end of the level. The enemies are coloured in light or gray colours while others are not to indicate whether they are friendly or not.

Audio Design, the audio design in Frinci and Rosie signals what part of the game the player is in. If the level music is starting to play then that means the character should start moving.

Player Avatar, the pet avatars lead people to the treats as they expect them to be able to eat those treats as most pets in real life do. It also guides them to the pet bowls as they expect them to want to go to their bowls as pets always seem eternally hungry.

Non-player characters, these would be the ghosts and vacuums in the game but these are not friendly instead they are enemies and force the pets to either avoid or fight them.

7.3 Sequencing

Sequencing is the process of presenting new information. It starts with an isolated introduction or the introduction in a setting where the player will not get hurt. At the very beginning, there is an instruction pop-up where the basic game mechanics are explained and all of the key mapping is relayed to the user. In the first level, there are no obstacles on the bottom level which allows the character to test the jump and run functionality. Next is expansion, in Frinci and Rosie the characters must use each pet's special ability to

move on to the next portion. Rosie must swim through some water and Frinci must climb a scratch post. Adding danger is done through assessing risk, in Frinci and Rosie the danger is added through the enemies. The players must defeat these enemies in order to move on to the next portion. Increased difficulty can be seen with each progressing level where more and more enemies are added. In the final level, the player must know all of these mechanics in order to win the level. Sequencing was also implemented for the narrative elements of the game. This is done mainly through two pop-ups. The first pop-up relays the premise of the game - the treat bag has gone missing. It also relays the call to action - the pets need help finding all of their treats. The second pop-up is at the end after the user has successfully completed the game. This pop-up thanks the user for helping the pets to get all their treats back.

8 GAME DISTRIBUTION

8.1 Virtual Reality (VR) Adaptation

There are a lot of considerations when it comes to VR adaptation. A lot of the elements that worked before will not work anymore, especially when it comes to game mechanics. For example, our game is a 2D multi-character platformer so there are a lot of key questions to ask when transforming a game like this to VR adoption. Questions would be along the lines of: "Will the game become a first-person perspective instead of the third-person perspective it was before?" Or "will it become just the person in the VR world playing the 2D game similar to how web browsing works in VR currently?" "If multi-character is kept, would the game now have to become mandatory multiplayer or would there be a way to keep the game as single-player?", "Would it require character switching, if we were to keep the single-player mode?", "How would the platforms work?", "Would it be a 2D abstraction or would it have to be redone and the levels and obstacles would become 3D?", "If we were to have a 3D game, how does that change the way the levels look?"

In terms of system adoption, there are a lot of considerations a possible adoption may look like: the monitor would become the player's headset monitor. The mouse is not used in the game so no conversion is needed. There are many keys used to control the charters there are the arrow keys assigned to Rosie as well as the space bar for jumping and the shift key for the attack, Frinci has WASD keys for movement as well as Q and E keys for attack and jump respectively, there is also the P and Esc key for pause menu. The input mapping to a headset would depend on the VR model but most have the same button layout but give the same amount of buttons.

Basing it off of a general VR headset the movement would be based on the joystick one joystick per character unless there is implemented character switching. The grip button may be used for the special ability while another button may be used for the jump and both controller's remaining buttons could be used for the pause menu. Then the menus could be used with the player hitting the button with their controller to physically make their selection. Another option or button would be a ball or another object that could be in the player's hand and they would have to throw it at the button they want to select. This would make the menus more fun.

Or the game may be adapted so the player is playing as one character at a time until they reach a certain checkpoint. So the player would start in a 3D rendered world of the 2D level, and they would move until there isn't any path left for them to try. The

movement could be based on physical movement such as walking would result in character movement, jumping may be due to jumping up and down. After all paths are exhausted or the character reaches their bowl it might switch to the next character and then it would rinse and repeat until the birth of the characters got to the end bowl. The game could be adapted to multiplayer, and remove the need for character switching.

Another interesting method the game may be donated to VR is through Fan fiction, there are many more fan-inspired games out there than before and some of those games might translate over to the VR world, maybe just a skin on a character in another game as a reference to Frinci and Rosie. The more fan games out there the more the game has a strong fan base to keep the game alive.

8.2 Revenue Generation

There are a lot of ways one could monetize Frinic and Rosie. The best method may be through ad-supported. The developers believe the game should be accessible to the general public. An ad-supported game would allow the developers to have the game posted on the marketplace for free but also be able to generate some income from it.

Another option is the freemium framework, this would look like the first few levels of the game being free but then the rest of them would be locked behind a paywall. This is meant so that after the player is already invested in the game they are more likely to pay to play the rest of the levels. The first few levels act as a free trial. It is believed this will not work for Frinci and Rosie because the main player base is meant to be causal so the players will not become invested enough during the free levels to pay for more levels.

The other model of revenue generation that it consists of is premise where a user pays upfront for a game. This would create more revenue to access the game the user needs to pay. This would not work for Frinci and Rosie as the game is not large enough in scope to gather enough interest for players to pay a fee upfront.

The idea of upfront payment could be coupled with recurring microtransactions. This would mean that the initial upfront fee of the game would become much smaller to make the game more accessible to everyone. After a solid fan base had developed and developed new enemies, abilities, and game art for them to purchase for a small price, this would allow for higher customization within the game. Customization makes games feel more personal for people and then leads them to become more invested in the game, which forms the microtransaction cycle of recurring small purchases. This model has shown great success over the past few years but we need to keep some checks and balances so that people do not spend a crazy amount of their money in the game.

Another method to monetize a game is by selling guides, if levels progress to a state where they become extremely difficult then the game developers could make a profit off of the game by selling how-to guides on how to defeat those levels. Or making a fan club the fans can pay a fee to join and they would get access to game mods or new levels that are not available in the base version of the game.

The game developers could sell seasonal skins of characters and the game elements that would keep income coming in season after season if there is a large fanbase. Another idea that could be implemented if there is a strong fanbase, is that other real-life merchandise could be sold. For example, Minecraft sells Lego bricks of the characters. A similar model could be possible for Frinci and Rosie.

A proposed model for our game would be to sell the game for around $0.99

cents and then sell parts of the screen for ads to outside companies for about $0.005 per view. This would mean we would make at least $0.99 from the sale of the application. If the user only played the game let's say 10 times the total for one person would be $1.04, now this is only for one person. But if we were to give our game away for free it would take 208 views in the game to make $1.04. So one must gauge the interest in their game before they list it for sale, if there is low demand then the initial $0.99 fee would be more beneficial. But if there is a large demand for the game the free game with ads would be a better route. The free version of the game would also allow all people to play rather than the select few who pay for games.

9 CONCLUSIONS

This report discusses the three layers of the layered tetrad, inscribed, dynamic, and cultural and dove into each of its components; Narrative, Mechanics, Aesthetics, and technology, Also briefly touching on cultural impact. Moreover, examining the game developers' goals for themselves as well as the design goals for the users. Paper prototyping was discussed in depth as well as private key visual examples. Game test data was included as well as personal comments from the game developers. Then expanding into a quantitative analysis of game balancing and game feedback. Player guidance was described in both its direct and indirect forms. Finally, the report touched on how a VR adaptation may occur and how one may monetize the game.

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