Vein

Music, Puzzle, Healing

My Role: Designer, lead programmer

A Music Rhythm Game with Puzzle-solving Path Planning

2022 NetEase Games College Mini-Game Challenge
Finalist Award (26/251), Popularity Award (3rd)

Taptap top-rated game, Top 30 Puzzle Charts
(https://m.taptap.cn/app/vein-246616)

Game Information

Keywords: Music, Puzzle, Casual, 2D, Path Planning

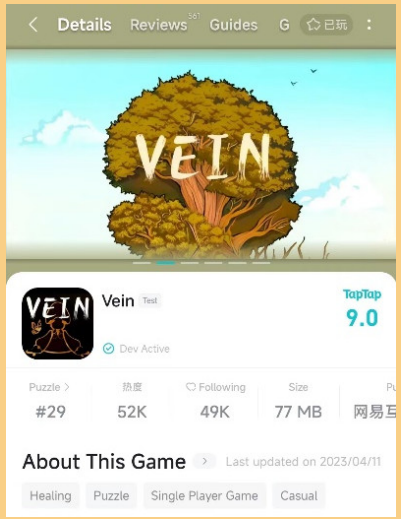
Development Engine: Unity3D 2020.3.26

Release Platforms: Windows, Android

Development Team Size: 6

Download Link: https://m.taptap.cn/app/vein-246616

Game Duration: 20~30min



Overview

This is the tale of a little mushroom, dedicating its life to transport a single droplet of water. The droplet's journey from treetop to root produces a melodic symphony of life, nurturing all it touches.

The story is set against the backdrop of China's fifty-year South-to-North Water Diversion Project and aims to convey that it's not just the life-giving water that deserves praise, but also those who have dedicated their lifetimes to studying water transport and saving lives.

Roles and Responsibilities

Game Designers: Leyan Wang, Kaishu Wang

Artists: Yixuan Xing, Yiting Wang

Programmers: Leyan Wang, Hongjie Ge

Music Composer: Kaishu Wang

Story Writers: Zhenxi Li, Yiting Wang

How To Play

1. Before each mini-level begins, the record will play a short melody. As it plays, the metronome in the top-right corner will indicate the beat, and players can replay the melody by clicking the record in the top-left corner.

2. Clicking on the pipe above the level will cause a droplet to fall. When the droplet lands on objects such as leaves and branches, it strikes notes. The notes struck during each attempt are also displayed in the beat indicator.

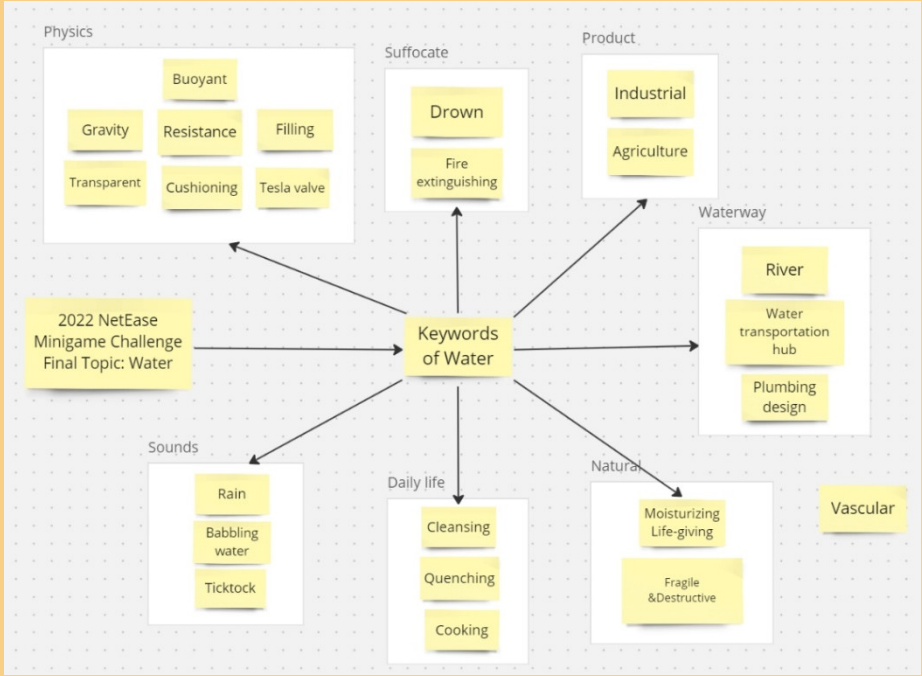
3. Players drag to change the position and rotation of objects within the level. When the player successfully **recreates the melody and the droplet enters the level exit**, the next melody segment is unlocked and entered.

4. Upon successfully reproducing a full chapter of melodies, the game will showcase the player's level-completion process through a continuous scroll. During this playback, additional instruments and vocal parts will be incorporated, enriching the overall musical.

Design Process

Given the 72-hour timeframe of the competition, we employed agile development, utilizing the aforementioned design process.

Keyword Brainstorming



The theme of the 2022 NetEase Games College Mini-Game Challenge finals is 'Water.' We brainstormed keywords related to 'water,' attempting to discover interesting gameplay mechanics or visual representations through combining these keywords.

Gameplay Brainstorming

Considering the team configuration with music production capabilities, we hope to leverage our strengths, combining water with music and rhythm, to design a game composed of simple mechanisms that can mass-produce levels, in order to create a game with a certain amount of experience and gameplay innovation within only 72 hours. Moreover, we hope the gameplay can provide a certain foundational support for the elucidation of the keyword theme.

These are the two versions of the puzzle game we discussed, with "recreating a melody" as the objective:

A

Players have a finite amount of water to distribute among several glasses. By allocating different volumes and striking the glasses—which produce different pitches based on their water level—in a specific order, they must recreate a predetermined melody

Difficult to explore the depth of the gameplay. Possible theme: rational allocation of water resources.

B

The ceiling has a leaking gap dripping water, and players can change the water path using a 45-degree baffle, with each interaction with the baffle creating a sound. Players need to plan the path of the water droplets to produce sound at a certain rhythm.

The game offers an intriguing experience, possesses depth in gameplay with potential for expansion, the level design involving path planning is challenging, yet there are numerous reference games availableresources.

Plan B reminds me of a short video I once watched (https://www.youtube.com/shorts/QD7B81Y5YC4):

A YouTuber used ping pong balls and pots and pans to play an NBA live broadcast opening melody. When the YouTuber successfully recreated the melody, he experienced great excitement and satisfaction.

I think making this satisfaction a driving force for players to decipher and game would be very interesting. After discussing with team members, we decided to develop and design in this form combined with Plan B.

Gameplay Design

Based on brainstorming, we determined the core gameplay centered on physical simulation, 2D path planning, and rhythm recreation. We referred to 'Where's My Water?' and 'Cut the Rope', both of which involve path planning, analyzing their puzzle design and difficulty curve design.

a. Props Design

The ability of these two games to offer such a wealth of varied content and deep puzzle-solving experiences stems from:

"1. The design wisely navigates **spatial usage**, involving strategic **segmentation** and **cross-utilization of areas**.

2. There are functionally diverse scene props, these objects are interconnected and all serve the gameplay of path or space planning, conducive to **emergent** puzzle level design.

Based on the analysis on the left, we designed the following scene props:

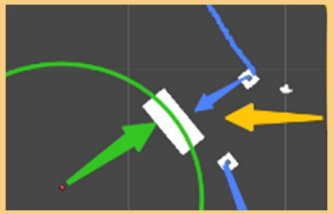
Object Name	Able to produce sound	Indicator pointer icon	Appearance Example	Function Description	Interaction Type	Design Purpose
Leaf	√			The water droplet slides along the surface after making contact.	Static / Translatable / Rotatable	Increase the ways to change the trajectory of water droplets
Branch	√			The water droplet undergoes an elastic collision at the moment of impact.	Static / Translatable / Rotatable	
Acceleration Ring	√			The water droplet accelerates or decelerates as it passes through.	Static / Translatable	Increase the speed range of water droplets. Adjust the hitting time interval
Polluted Water	×	-	-	Water droplet awaiting purification.	Physical Simulation	Increase thehitting elements, add rhythm voice part.
Seesaw	√			The accelerated water droplet, rushing towards one end of the seesaw, can lift up an item at the other end.	Static & Physical Simulation	Provide initial momentum for the wastewater, open the secondary voice part
Water Purifier	√			Purify and collect the entering wastewater, bursting into musical notes in the moment of purification.	Static	Collect and purify wastewater, indicating the end point of the wastewater path
Withered Leaves	√			The accelerated water droplet will be pierced through upon impact, while the effect is the same as ordinary leaves when an unaccelerated water droplet hits.	Translatable	Utilizing the wide speed range of water droplets to introduce variables for reusing the same prop
Water Pipe	×	-		Water droplets entering from one side will be shot out from the other side at the entering speed after a period of time.	Static	A tool used in level design for segmenting space, altering the location, and velocity direction of water droplets. Adjust the hitting time interval

b. Interaction Design

Rotate around a Point

If all the scene props could be rotated and moved, the possibilities and complexity of the scene would be difficult to predict. We have designed it so that only some of the scene props can be moved or rotated and marked the allowable operations on the props. Players need only find and complete the answer path when a large part of the scene props is already determined.

Furthermore, we designed the prop rotation to be **around a central point**, rather than spinning on its own axis, allowing the prop to rotate and move simultaneously along a predefined circular path.



Graded Adjustments

Unlimited discrete movements and rotations would exponentially increase possibilities with each object interaction, posing a significant challenge for players to find a successful path. As a compromise, we've confined player actions to **graded adjustments**, like 15-degree rotations or 5-unit movements, and set limits on maneuverable range, ensuring that players navigate through a reasonable, finite set of possibilities rather than an overwhelming expanse.

c. Metronome

For many people who do not have an accurate perception of rhythm, recreating the beat from memory can be quite challenging. Based on this fact, I designed a hint metronome.

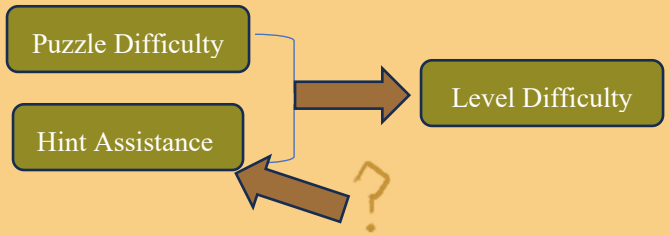
Notes played by the player

Notes played by the record

The beat indicator inside is a tape-like scroll, rolling from right to left. When the water droplet launched by the player first contacts the scene prop, the beat indicator will continuously pin the correct rhythm indication icons at the lower half of the scroll at the correct beat interval according to the record. Whenever the player's launched water droplet hits a scene prop, the indicator will pin an indication icon at the upper half of the scroll from the center pointer. The player can discern whether their beat point is ahead or behind by comparing the icon position of the record and their own, and adjust the scene props accordingly

Indction Icon Style

The pointer will indicate which type of scene prop generates the beat, providing players with clues about the path. Among these pointers, we will intersperse hidden prop-type hints, represented by a '?'. This design is conducive to dynamically adjusting the puzzle's difficulty.



d. Conclusion

The aforementioned designs gradually adjust the overall difficulty of game deciphering, ensuring that the game difficulty approaches a moderate range.

Some mechanisms also become important tools for dynamically adjusting level difficulty during the level design process.

We hope that players can enjoy the process of the little water droplet playing melodies in a light and pleasant mood, without facing too much pressure and challenge in the puzzle solving process, as the difficulty of the puzzle solving is set to a relatively low range.

Level Design

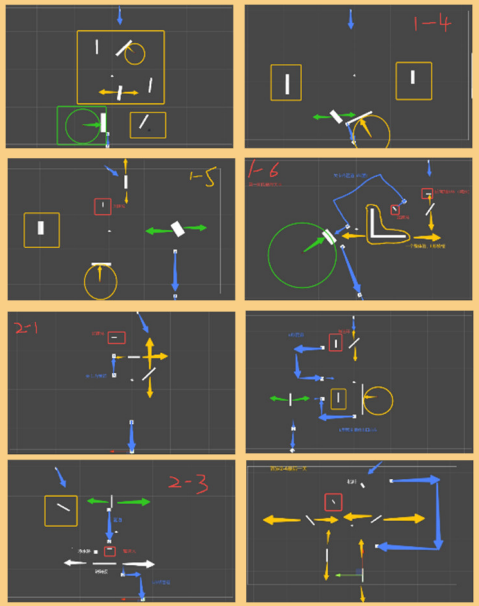
Difficulty Factors:

1. Note Count
2. Degree of Path Intersection
3. Critical Node Indicate (e.g. Acceleration Rings, Teeter Boards, and other rare items)

(Critical points in the melody are often only one, and players can make assumptions by splitting the previous and next parts based on the number of beats before and after this point, aiding in solving the puzzle)

4. Adequacy of Hints
5. Repeated Utilization of the Same Object

Partial Level Whitebox Sketches



Due to the necessity of synchronizing the creation of music that matches the levels, the level design is constrained by the progress of musical composition. At times, adjustments need to be continually made to one element based on the other (either the music or the level design). Consequently, we have only designed 10 levels along with their corresponding musical scores.

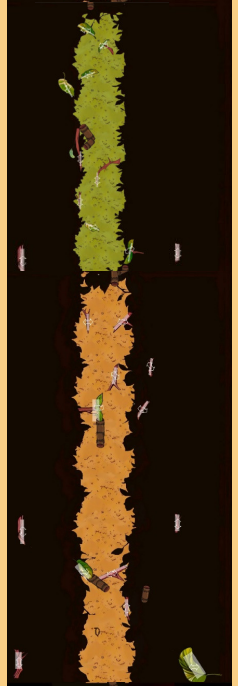
In order to better integrate music gameplay and route planning, we strive to make the music the 'sole' solution for transporting droplets, meaning: although transporting droplets is the goal of the game, players are meant to accomplish this more easily with musical cues. The melody is not the result of strikes during transportation, but rather a clue guiding the decoding. We attempt to reflect both elements (music and route planning) in a unified manner rather than in isolation during the level design. Therefore, we try our best to ensure our levels adhere to the following principles:

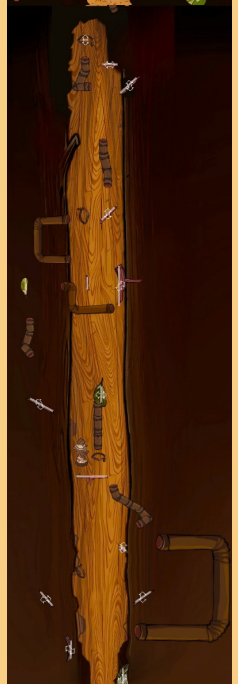
1.The only way for the droplet to enter the exit pipe is to reproduce the specified melody.

2.The musical melody and provided hints can effectively guide players to gradually get the droplet closer to successfully entering the exit pipe.

3. Any portion of the path that has accurately recreated part of the melody is assuredly correct.

To make the aforementioned third point work better, we ensure that the correct musical note is played only when the water droplet strikes the correct scenic object at the right rhythm; otherwise, only an impact sound corresponding to the material struck is played.

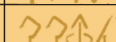




Example Level

Note Count: 5
Path Intersection: 0.5 (A certain Intersection along X)
Critical Node: 0
Adequacy of Hints: 4/6 (2× “?”)
Repeated Utilization of the Same Object: 0
Overall Difficulty: 4

Note Count: 7
Path Intersection: 1 (Intersection along both X&Y)
Critical Node: 2 (Withered Leave & Acceleration Ring)
Adequacy of Hints: 5/7 (2× “?”)
Repeated Utilization of the Same Object: 1(Withered Leave)
Overall Difficulty: 6.5

Level ID	Hint Sequence	Solution Sequence	Hit Repetition Count	Difficulty
1			0	2
2			0	2.5
3			0	4
4			0	3
5			0	2.5
6			1	4
7			2	4.5
8			1	5
9			0	5
10			1	6.5

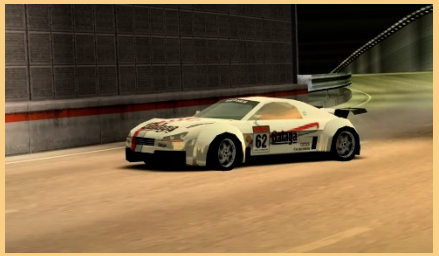
Other Design

Completion Clip

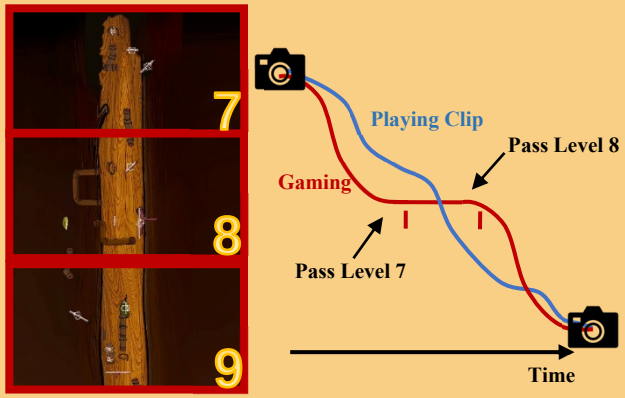
Water, the sustenance of all life, may render a single drop seemingly inconsequential, yet within the recesses of withered wood, it might signify an entire spring for a burgeoning bud. In our game, there exists only one droplet of water, always being transported by the players throughout the journey. To illuminate this concept to our players, the notion of showcasing a clip came to fruition.

The clip seamlessly ties together the game segments that were initially broken down into smaller levels, with the droplet cascading continuously from the highest point right through to the end of the major level. Every exit of a mini-level is linked to the entrance of the next. Concurrently, the continuous levels mean a continuous musical experience, as pieces of music originally split into segments are united to form a complete movement.

I personally believe that allowing players to review their performance within the game provides a novel emotional experience. It's a method that extends the feeling of accomplishment. The audiovisual embellishments during this process can profoundly influence the players' actual emotional response.



I still remember when I was a kid, playing Ridge Racer 2 on the PSP. Whenever a race was completed, it would play back highlights of your performance throughout the race. The game would choose the best camera angles based on different sections of the track, making me feel like the star of a high-octane racing movie.

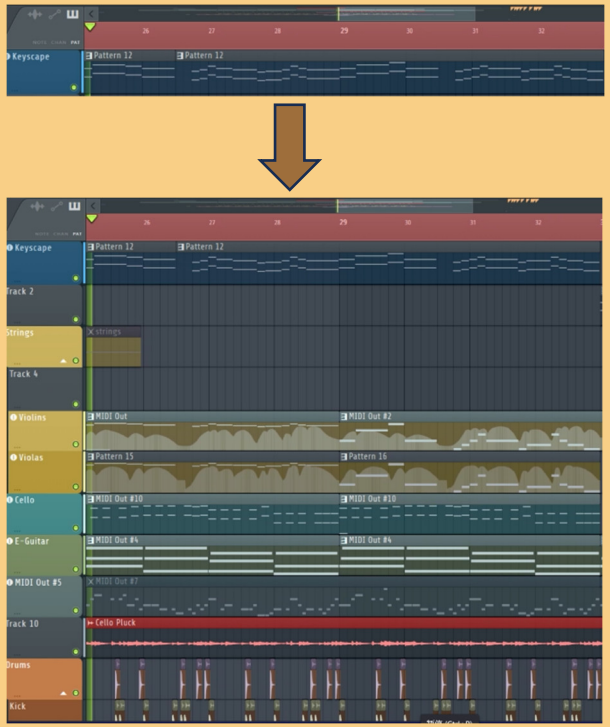


For the camera movement during the playback, we drew inspiration from the 3rd 3D Rendering Challenge, Dynamic Machines. The camera doesn't move and stop intermittently but instead follows the droplet, maintaining a consistently downward, non-uniform motion throughout.

However, due to an oversight, we neglected the time interval from when the water droplet flows out of the pipe to the first strike while creating individual levels. This resulted in some levels, during the playback transition, where the droplet from the previous level had not yet entered the exit, while the droplet for the next level had already started flowing. This is certainly an aspect we need to adjust moving forward.

Music

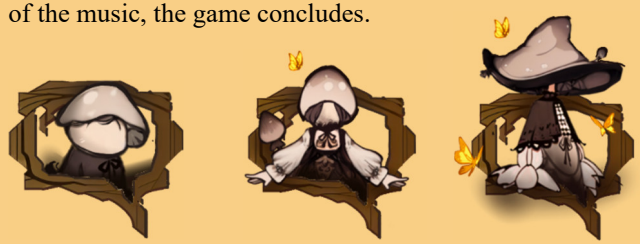
In the puzzle solving process, players require clear main melody notes, so we opt for a singular musical part at this stage, eliminating unnecessary instruments and vocal parts to avoid confusing the player's identification of the main melody. Upon concluding a chapter and entering the replay, section, we reintroduce various musical parts, enriching the auditory experience and elevating the emotional climax.

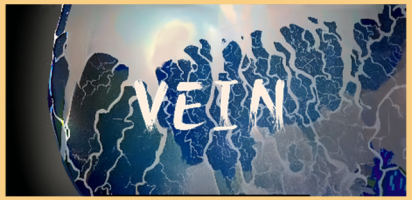


Music unfolds progressively; the same melody, through varied performances and emotional expressions, can escalate in a crescendo. When players enjoy the replay, the music becomes more enriched compared to the solitary notes during the puzzle solving process – a progression in its own right. Personally, I believe music sometimes serves as an art form that avoids granting listeners rapid satisfaction, building momentum through repetitive melodies and unleashing at the right moment to gratify the audience. In this regard, I think the music in our game can achieve a similar effect.

Narrative

The gameplay chronicles the life journey of a little mushroom. The narrative unfolds through the mushroom's personal monologue. As players progress through levels, the mushroom matures in form, evolving from a naive understanding of water's significance to dedicating its entire life to it. In its final moments, a droplet lands on the mushroom's cap. The camera zooms into a microscopic view where the droplet transforms into an expansive ocean within the mushroom's tissue. Accompanied by the climax of the music, the game concludes.



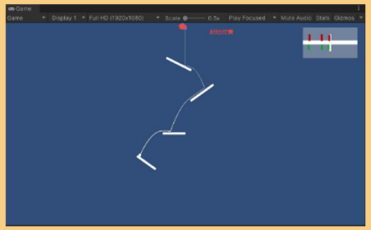


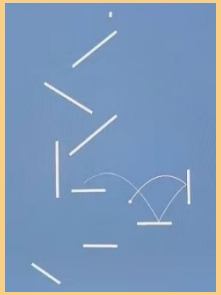
Name

Rivers act like the veins of the Earth, while leaf veins mirror those of a leaf, with a complex network of veins sustaining various levels of water supply throughout nature. Regardless of the perspective, whether micro or macro, water diligently plays its role. The actions of the little mushroom might seem to be in vain, yet just like the impartiality of water, rivers can nurture civilizations, and a single drop can bring spring to a new bud. There always has to be water to do these things.

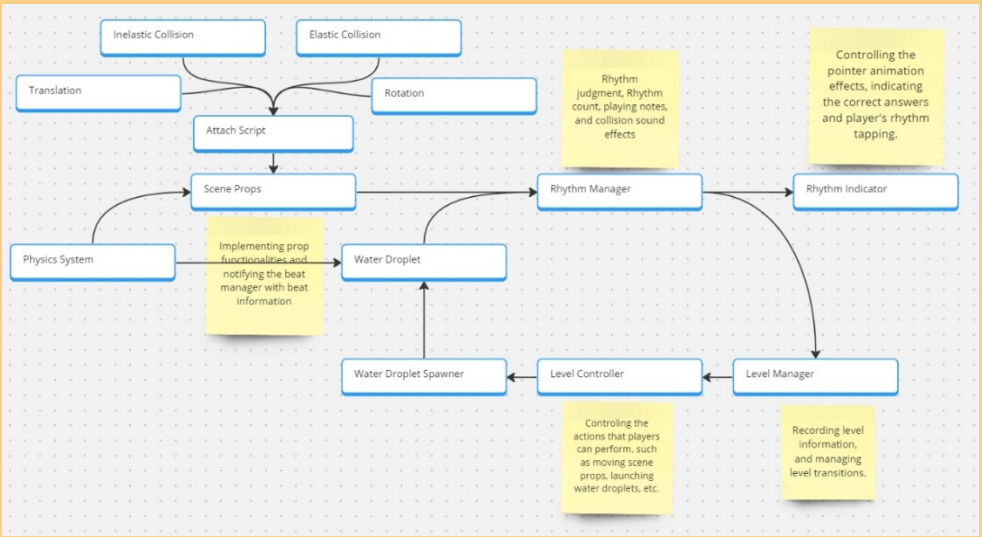
Development Process (Selected)

In the early stages of exploring gameplay, we rapidly created an **electronic prototype** to validate the **feasibility of rhythm recreation** in this gameplay."

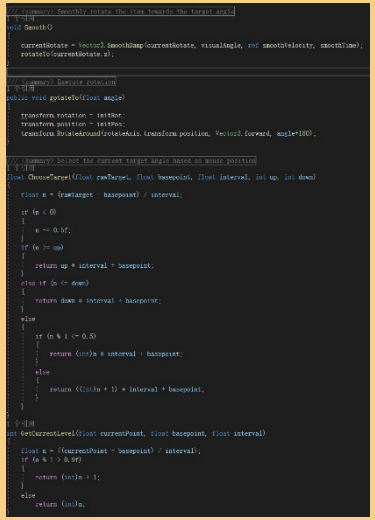




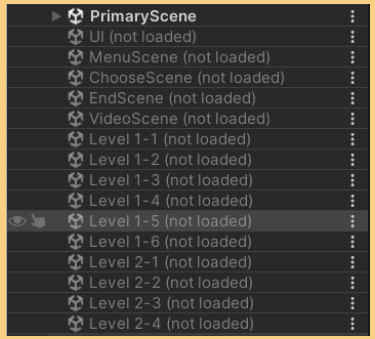
Before the formal development began, we listed the program framework for the game loop and generally organized the code according to that structure.



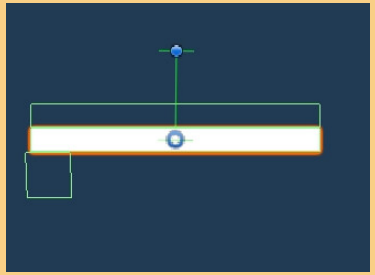
Elastic Collision Function Script



Implementing Smooth, Graduated Rotation Based on Mouse Position



Using level overlay and dynamic activation, seamlessly switch between levels with a scrolling style



Using Distance Joint 2D to Simulate a Physical Seesaw

My Contributions to Vein

Design Part

1.Shaping the game mechanics and designing the gameplay loop (with Kaishu)

2. Designing the beat indicator.

3. Designing the concept and presentation of replay clip.

4. Writing the game design document and art requirement sheet

5. Designing scene props (with Kaishu)

6. Level design (with Kaishu)

7. Building levels and conducting testing (with Kaishu)

Development Part

1. Early prototype iteration

2. Physics system reconstruction

3. Scene props functionality implementation

4. Beat indicator logic function implementation, display effect design and implementation

5. Beat manager logic judgment, and note management playback control

Post-production Maintenance Part

1. Adjustment of the start screen interaction guide

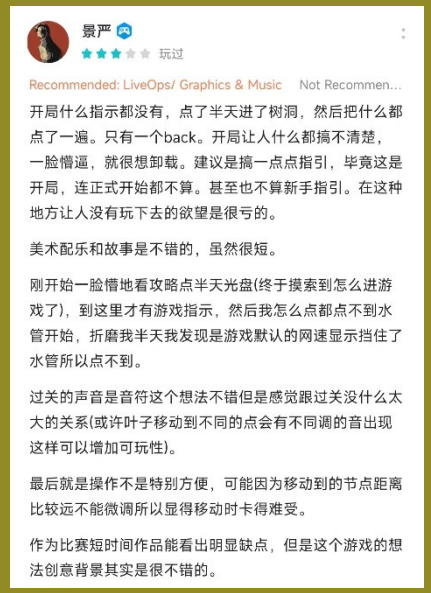
2. Offline save functionality

3. Fixing adaptation issues across different devices.

4. Control optimization

Feedback & Insights and Reflections

The game's starting screen is designed around a 'search-for-the-record' interaction, where players can explore the little mushroom's living environment while searching for a record. Upon clicking the cupboard three times, the record falls out and can be picked up by the player, who can then click on the little mushroom to enter the level selection screen. Due to a lack of guidance, players found it challenging to proceed to the levels as intended. After receiving feedback about this issue from many players, we promptly added text prompts. As a result, low scores due to insufficient guidance ceased to increase, and the game's rating significantly improved.



Key Translations

“Insufficient Start-Up Instructions”

“Nice music and art, but it's a bit short.”

“Missing in-level operation prompts.”

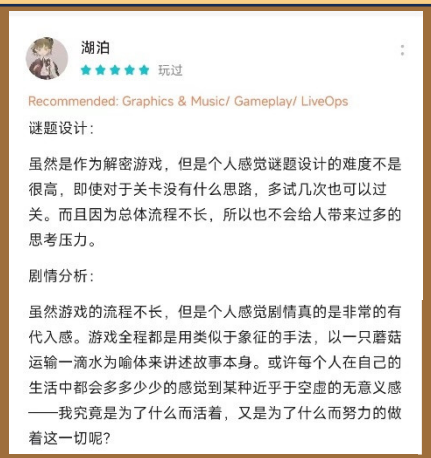
“The idea of using musical notes as the sound for level completion is interesting, but it doesn’t seem to have much relevance to passing the level (perhaps changing the pitch as the leaf moves to different locations might enhance playability?)”

“The controls are inconvenient”

“The idea is pretty good.”

Some players have very personalized understandings of the game plot or gameplay meaning, some of which are not our intention. However, having so many people express their views and discuss our game makes us feel immensely satisfied.

But as some players have pointed out, the puzzle-solving part gives an impression that repeated attempts will inadvertently lead to success, and the game's gameplay support for 'the catch' in puzzle design needs further exploration. Although most players said that the beat indicator greatly helped them recreate

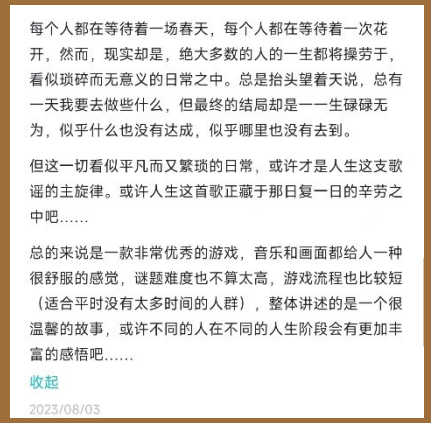


"As a puzzle game, the difficulty is somewhat low; even without a strategy, one can pass the levels through trial and error, without too much pressure to think."

"The game is immersive, using a symbolic approach throughout, telling a story through a mushroom transporting water. Perhaps everyone, to varying extents, feels a sense of near-emptiness and meaninglessness in their lives at times, prompting us to ponder: for what do we live?"

the melody, many players reported that they successfully completed the puzzle without using the beat indicator. The function of the beat indicator needs to be further amplified through more meticulous level design.

I believe that **Critical Node Indicate** I mentioned in **Level Design** might be a crucial approach to address the aforementioned issue, an aspect that still awaits exploration.



“Everyone is waiting for a spring, for flowers to bloom. However, the reality is, the majority of people spend their lives laboring over seemingly fragmented and meaningless daily routines, always looking up at the sky and saying, 'One day, I will do something.' But in the end, many live a life of mediocrity, seemingly accomplishing nothing, seemingly without a channel anywhere.

But perhaps all these seemingly ordinary and tedious daily routines are the main melody of the song of life. Maybe the song of life is hidden within the labor that goes into each day...

"Nice game. Perhaps people at different stages of life might have richer insights, right?"The idea is pretty good.”

In this creation process, we explored rapidly and bulk-producing decryption levels through a simple decryption rule and limited scene objects. Without a doubt, this is an excellent design approach for a small team.

I also learned to incorporate compensatory rules or mechanisms to adjust the game difficulty, shaping a reasonable difficulty curve.

We once again explored the design ideas of music games. I believe that games are a great medium for music, where the interaction through gameplay can make players more consciously appreciate and deconstruct music to understand it better. As long as visual and musical performances are properly coordinated, they can provide unparalleled audio-visual enjoyment.

In this project, we utilized AI for artwork generation for the first time, which shortened the original art production time and allowed us to make better use of limited time. This was also my first time publishing a finished game on a gaming platform. I experienced the importance of receiving and listening to feedback and am delighted that so many people could experience and enjoy our game. I believe this is why I want to engage in game design.