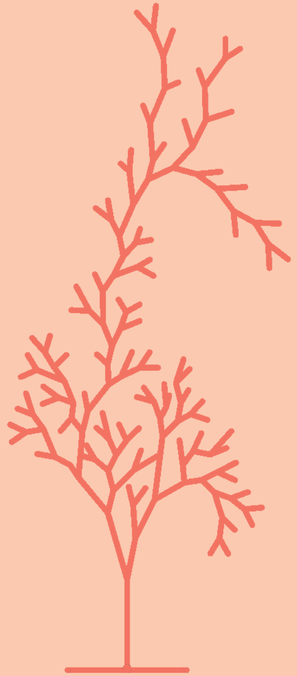
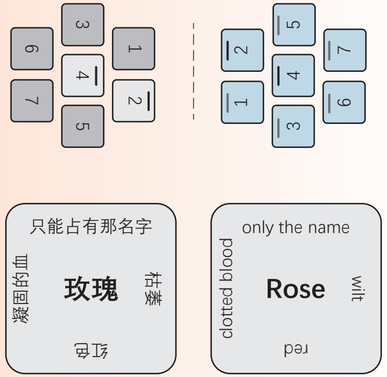
Portfolio of Zihan Liu



Evo Tree 101

Exp10sion

Rose and Poem

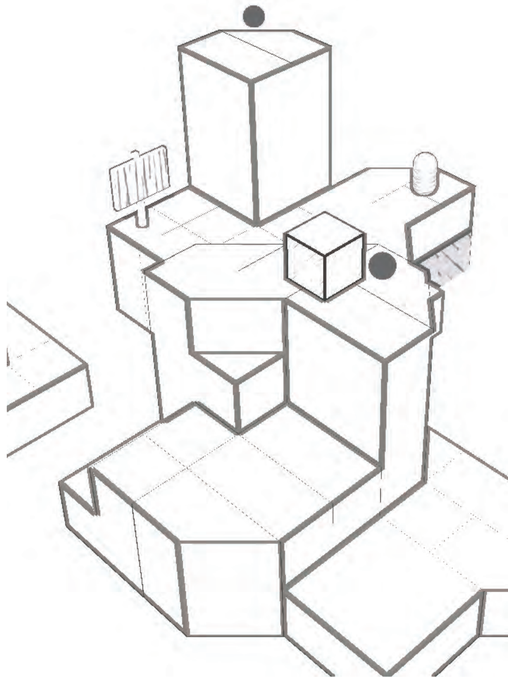


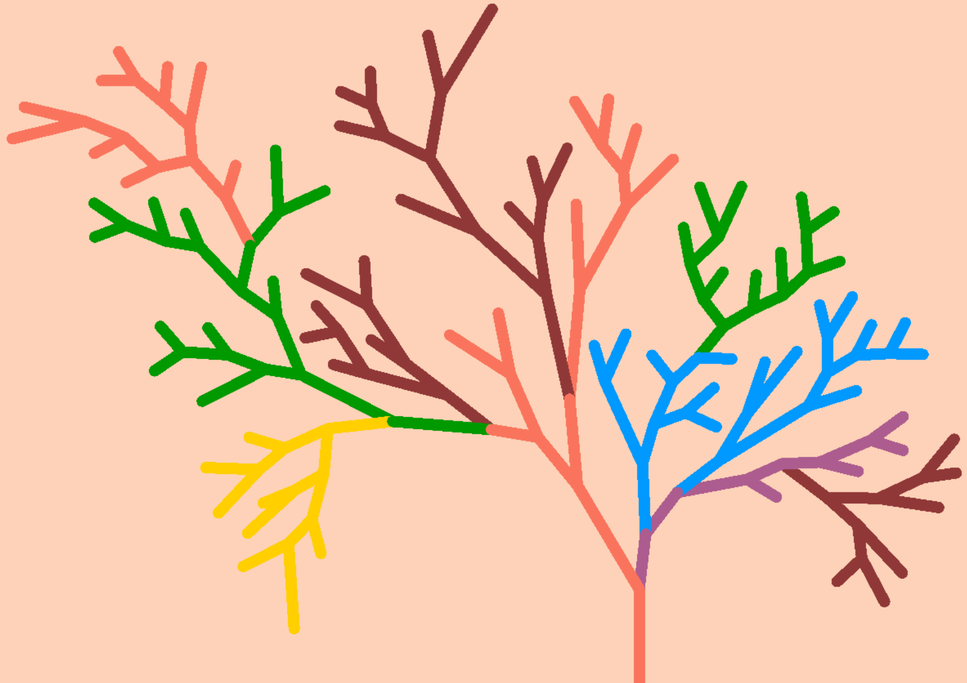
现代生活 死了
Modern life is dead.

不断旋转的 猩猩 想回到从前
A whirling gorilla wish to go back,

却看不见 欺骗
but can't see the deceit.

Shadiness





Evo Tree 101

A evolutionary tree simulator and displayer

Introduction

This is a small experimental game focusing on tree strucure.

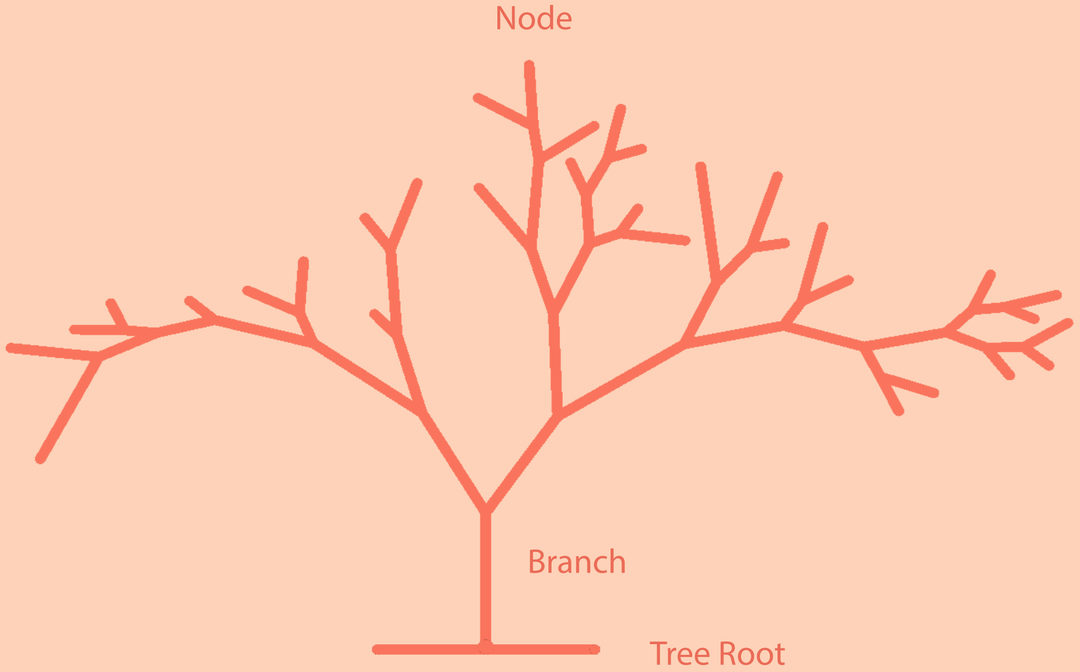
Players can watch a tree grow, change its pose, shape, or color,
Players can also prune old branches or give birth to new ones.

Players will get a tree graph created by themselves.

Demo: https://xiu0922koway.itch.io/evo-tree-101
Video: https://youtu.be/mZ4dKzh_eew

Contributions

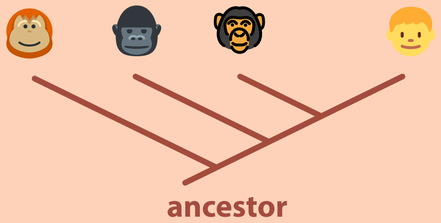
The game is solo-developed by myself.



Inspirations — Tree

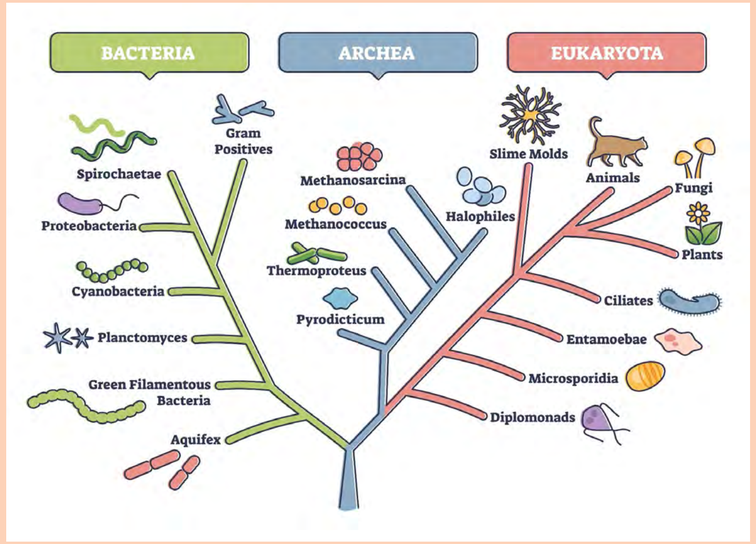
A evolutionary tree is mostly a binary tree structure, representing evolutionary relationships.

The tree structure has the beauty of abstraction, minimalism, and variability.



Researches enjoy adding colors on trees, to illustrate informations e.g. time and region.

These color and poses could make the tree more beautiful and complicated.



a colored tree of main biological kingdoms

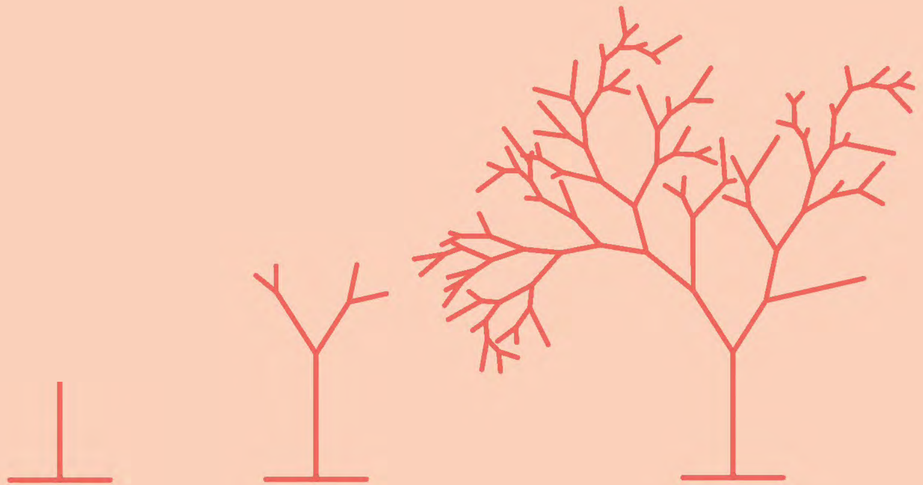
Inspirations — Artificial Nature Game Jam

I used to be a researcher in the field of evolution, and evolutionary tree is an important part of my understangding toward nature.

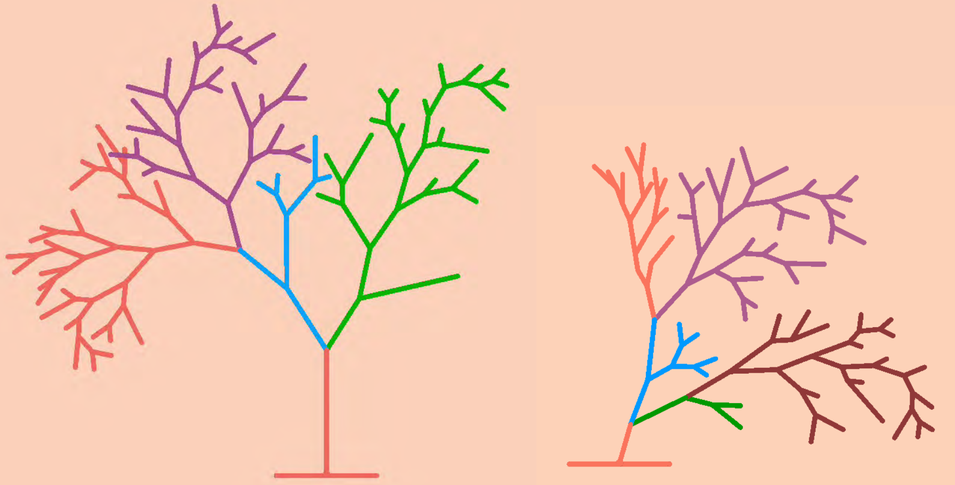
Human are affecting all life species and their positions on the tree of life, manifested as extinction and domestication.

Therefore, in this jam, I decided to interpret “nature” as the tree of life, and “artificial” as human’s influence, paralleled with the player’s interaction with the tree.

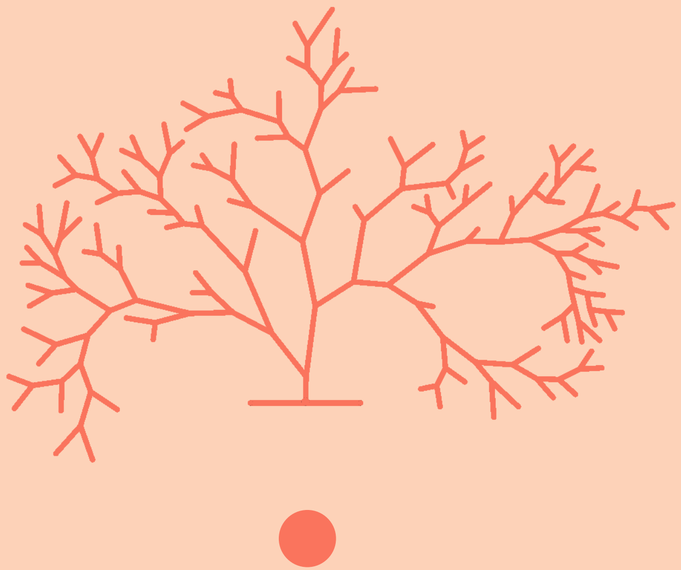
Gameplay

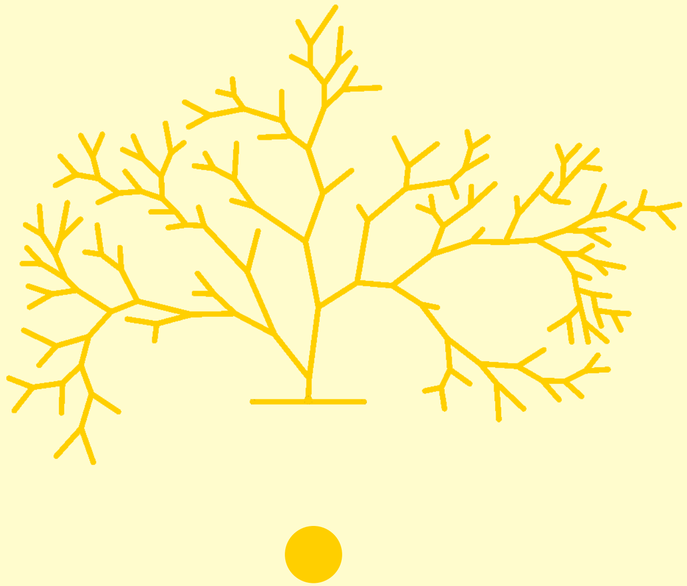


Tree grow

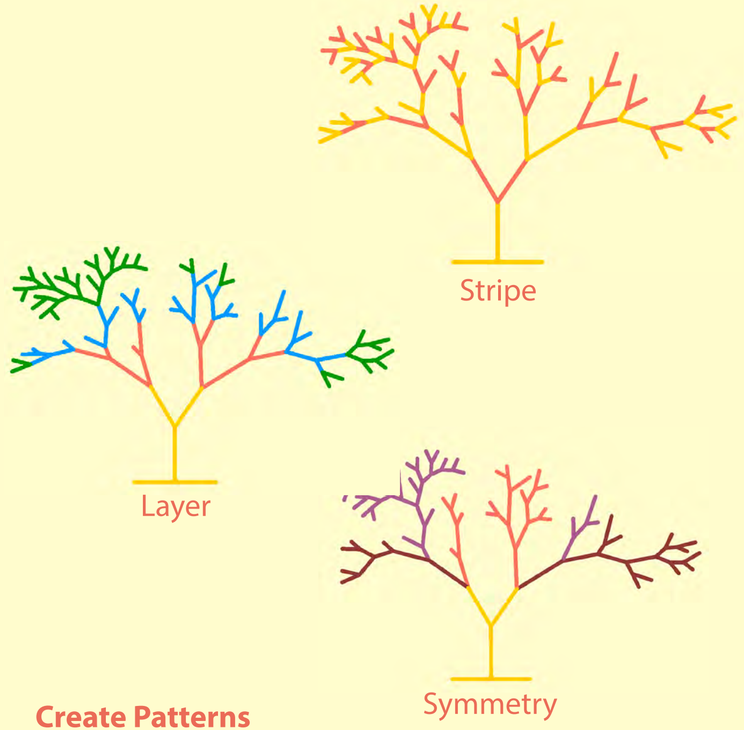


Color and Display



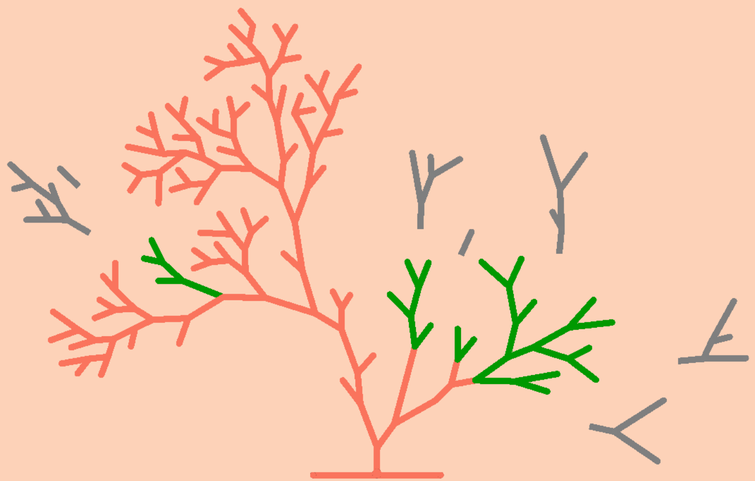


Change Base Color



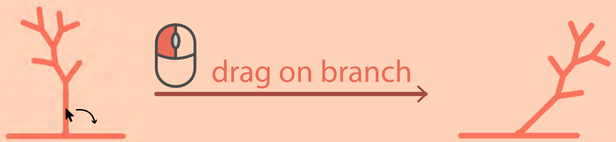
Create Patterns

Prune unwished branches

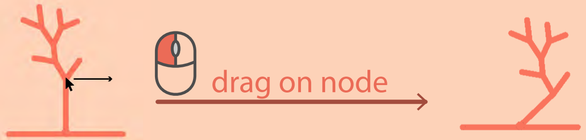


Grow new branches

Interaction

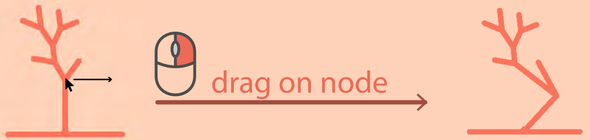


rotate an entire clade

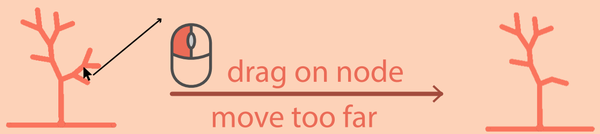


move an entire clade

grow new branches



move a single node



prune branches

color an entire clade

color the entire tree and background

I need player's operating to be direct and simple,
just like player is really fiddling with the tree using **mouse**.

Development

TreeNode to save tree informations.

```
public class TreeNode
{
    public string name;
    public int step;
    public int directionInt;
    public float branchLength;
    public GameObject nodeObject = null;
    public GameObject branchObject = null;
    public TreeNode leftChild;
    public TreeNode rightChild;
    public TreeNode parent;
    public bool branchGrowOver = false;
    public float branchGrowLength = 0;
    public List<TreeNode> cladeChild = new List<TreeNode>();

    public bool isDead = false;

    public Color color;

    public TreeNode(string name, TreeNode leftChild = null,
                    TreeNode rightChild = null, TreeNode parent = null)
    {
        this.name = name;
        this.leftChild = leftChild;
        this.rightChild = rightChild;
    }
}
```

Each node have a parent node and 2 child nodes.
Iterate from the tree root node to generate a tree.
Iterate from a node to operate its entire clade.

```
public class TreeOperating : MonoBehaviour
{
    public static void RotateClade(TreeNode node, float rotateAngle)
    {
        foreach(var child in node.cladeChild)
        {
            if(child.nodeObject!=null)child.nodeObject.transform.RotateAround
            (node.parent.nodeObject.transform.position, Vector3.forward, rotateAngle);
        }
    }

    public static void MoveClade(TreeNode node, Vector3 movement)
    {
        AngleChange(node);
        foreach(var child in node.cladeChild)
        {
            if(child.nodeObject!=null) child.nodeObject.transform.position += movement;
        }
    }
    .......
}
```

LineRenderer to draw branches.

Iterating

a prototype
generating random tree

first version

1 background color; no sound;

Too punishable:
random branch loss by interaction,
paralleling human influence on nature;

current version

6 background color;
random piano sound;
more tolerant to interactions;

Exp10sion

A pixel-art puzzle platformer focusing on Time and Loop

Introduction

In this time-themed puzzle game, player will control a bomb that explodes every 10 seconds.

Every explosion opens a new round. Player could solve the puzzle with the help of the bomb in previous round.

The game was released on Steam on Dec. 8 2023, with more than 70 levels and 6 chapters.

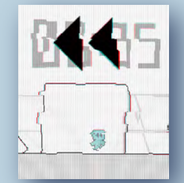
Store Links: *https://store.steampowered.com/app/2618850/Exp10sion/*

Inspirations

Exp10sion was prototyped at Ludum Dare 51. The theme is "Every 10 seconds". The name Exp10sion is the combination of "explosion" and "10s"

Time Loop is a common theme suitable for the jam theme.

Time is also great for present puzzles.



Retro Rift

Glich Loop

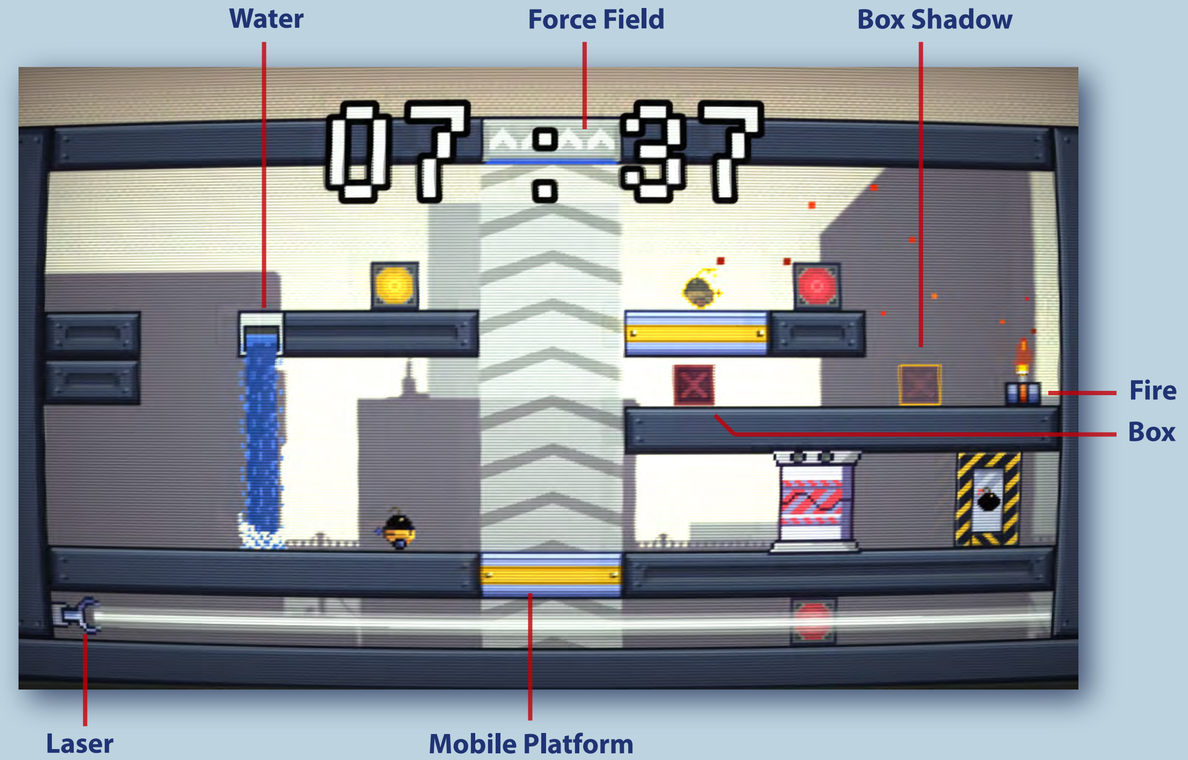
Contribution

Game Design
Level Design
Programming
Art

Core gameplay was designed during the jam, by a team of 6.
3 of us continued developing.

Levels: 43 out of 71 levels; leading level structure and difficulty design
Gamplay: new machanisms design; platforming design
Systems: tutorials design; game progression design
Art: post-processing; a part of UI and scene assets;


Key tutorial
Countdown UI
Door
Target
04 : 29
H
Help
Shadow Repeats
Shadow
Player
Button
Puzzle Hint


Water
Force Field
Box Shadow
07 : 37
Fire
Box
Laser
Mobile Platform

Development Timeline

Oct. 2022

Oct. 1 - Oct. 4 — **Ludum Dare 51**

- A prototype with 10 levels was made.
- Core gameplay was constructed and tested.
- LD Page: *https://ldjam.com/events/ludum-dare/51/*

Jun. 2023

June — **Decided to continue this project**

- Decided to publish on steam.
- Reconstructed codings.
- Planned final content and development duration.
- Second new machenisms was designed: Force Field.

October - November — **Prepared to release**

- Levels iterations.
- 10 more levels in a new Chapter were built.
- Level-selection system was redesigned; added tutorial system.
- Offline playtest: G-Fusion 2023 Chengdu; UCSC Indie Game Playtest Night
- Steam publish preparation: studio account, dev comp, advertising assets, etc.

Dec. 8 — **Released !!!**

After jam development — **Oct. 4 - Nov. 15**

- Modified gameplay and fixed bugs, based LD feedbacks.
- A new machenism, “Box”, and 4 relative levels was made.
- Received top 20 most feedbacks and ratings in LD website.

Level constructing — **July - September**

- Other new machenisms were designed: Laser and Fire.
- All machenisms were developed and tested.
- Constructed 60 levels in 5 chapters.
- New art and music assets.

Before releasing — **November - Dec. 8**

- More playtesting
- Store Page release
- Localization
- Pricing
- Demo release

After releasing — **Dec.8 - Present**

- Bugs fixing, difficulty adjusting and adding new features based on feedbacks.
- Advertising and marketing.
- Seeking playtests and reviews.

Level Design

Goals and limits shape the level deigsn of game.

Level Design

Goals

internal goals

Goal within levels: "Reach the Target"
- Target looks clear.

Puzzles
- Creat **Eureka moments**.
- Puzzles have topology. Present interesting puzzle topology as much as possible.
- Show the potentials of our core mechanism.

Mechanisms
- Every new mechanism should be ***introduced***, ***developed***, ***twisted*** and ***concluded***.
- Show the potetntials of each mechanisms and their combinations.

Fun
- Try to be multi-solution and dynamic.

external goals

Time
- I need player to play enought time, but not too long.

Appearance
- We wish the levels to be appealing at first look.

Ultimate deigsn goal:
Application of gameplay.
Present interesting and fun levels.

Level 1-7
- The 1st level with strong **Eureka moment**.
- The eureka moment came from **puzzle topology**, the topology we called "Nested".
- To finish this level, player need to think more about the core mechanism.
- Level 1-7 is the ***twisted*** part of the core mechanism: shadow.

Level "Maze 1"
- This level a combines multiple mechanisms: "laser" "box" and "force field".
- There are various potential states. The level is multi-solution and dynamic.
- Look like a maze. I wish the level to looks amazing throughout playing.

Level Design

Level Design

Limits

internal limits

Player Ability
- Jump height, move speed and body size.
- Only cast 1 shadow.

Time and Loop
- Only 10 seconds to move, the level can't be big.
- Leave at least 2 seconds for player when finishing.
- The level better be finished within 4 loops.
  More loop require more time and less mistakes.

Puzzles
- Not to be too difficult or too similar with others.

Layout
- Be easy for player to recognize the obstacles.
  A level can't have too many things to confuse player.
- Don't overlap with UI elements.

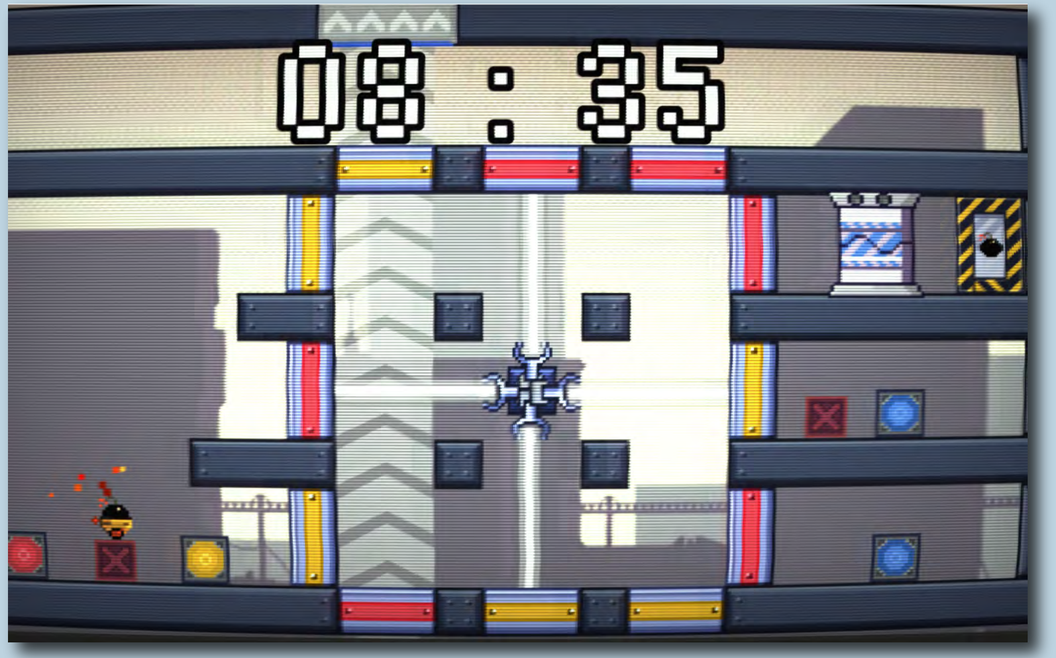
external limits

Difficulty
- Don't be too difficult, so that less players will enjoy.

Capability and Efficiency
- We do this in part-time. Be quick.

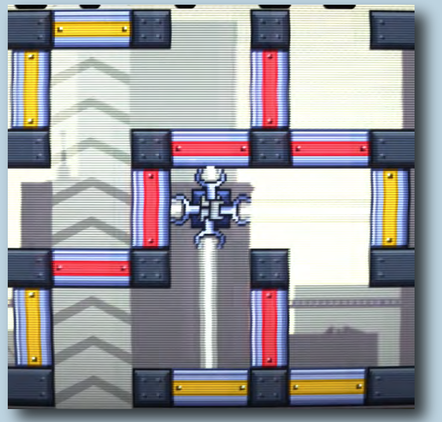
Level 5-A
- Player on the left, target on the right; space for countdown UI; clear obstacles
- Level 5-A is a Challenge level, which is more difficult than a normal level.
  But not too difficult if player learn through previous levels.

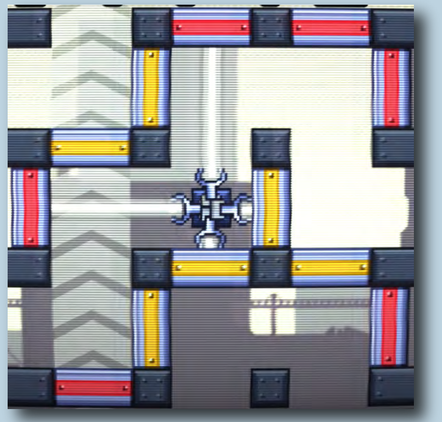
Levels *example*

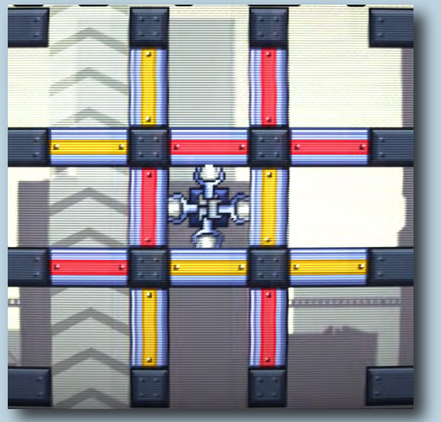


Level "Maze 2" in extra chapter

I would say this is my best level. It is beautiful, symmatric and dynamic, and it is puzzling.
The correct paths would appear when the maze is changing.



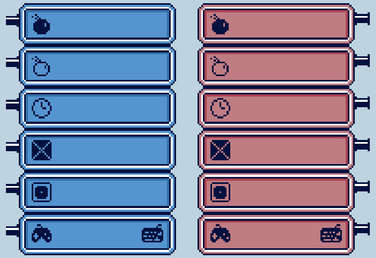




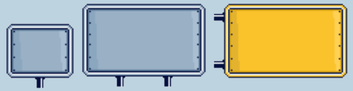
When players finish this level, their movement will be fluent and rhythmed.

Pixel Art Assets

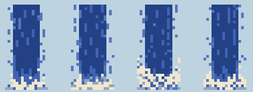
I drew part of the UI assets and objects in the scene, using *Aseprite*.



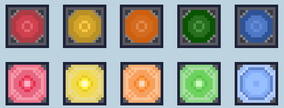
Tutorial Page UI button



Tutorial Board



Water animation

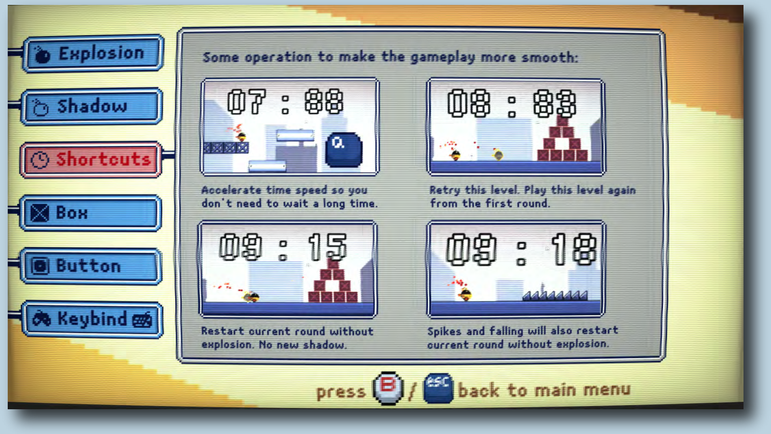


Buttons, default and responding

Water Door, defualt and responding

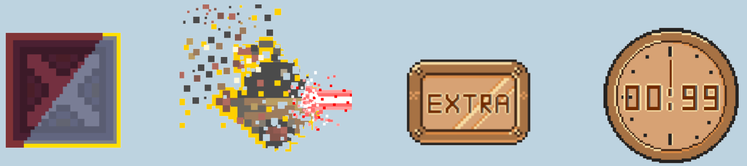
Gate to other levels, in the Transition Scene

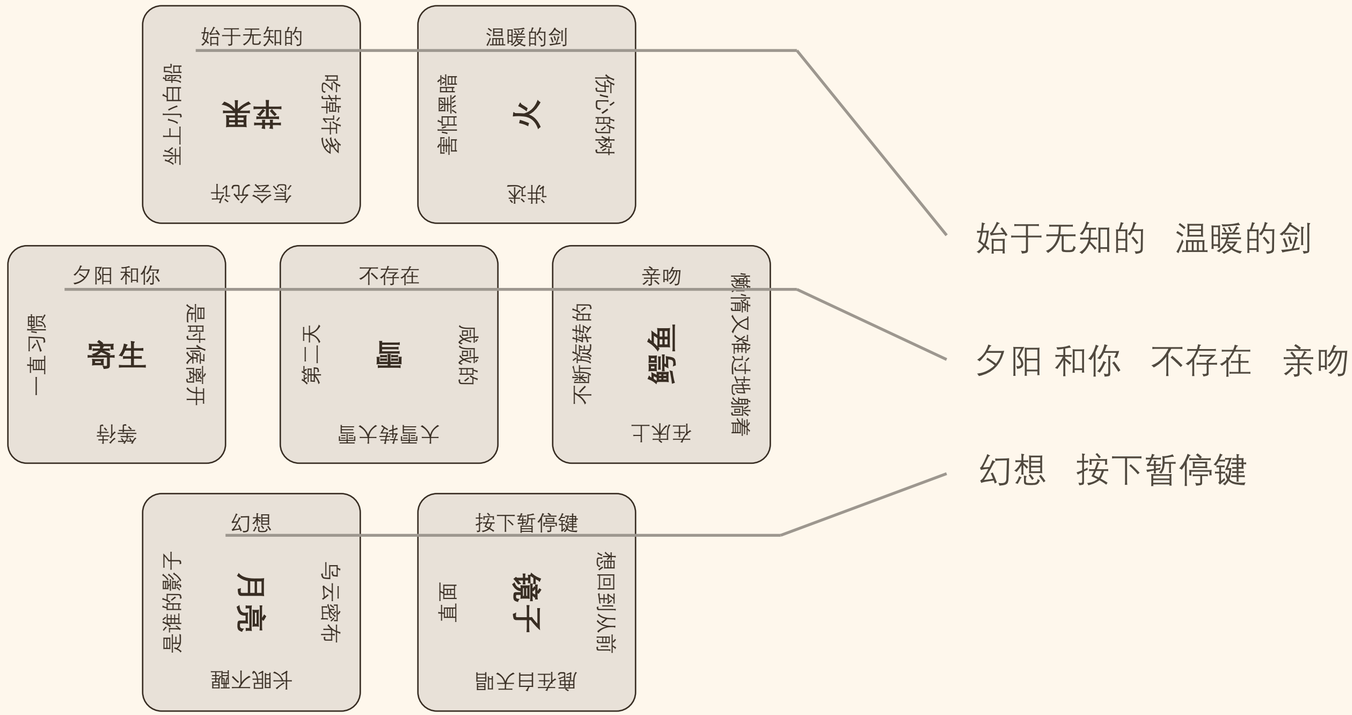
I designed the UI layout and made the tutorial page.



I made most particle effects.

I also drew the Steam achievements logos.

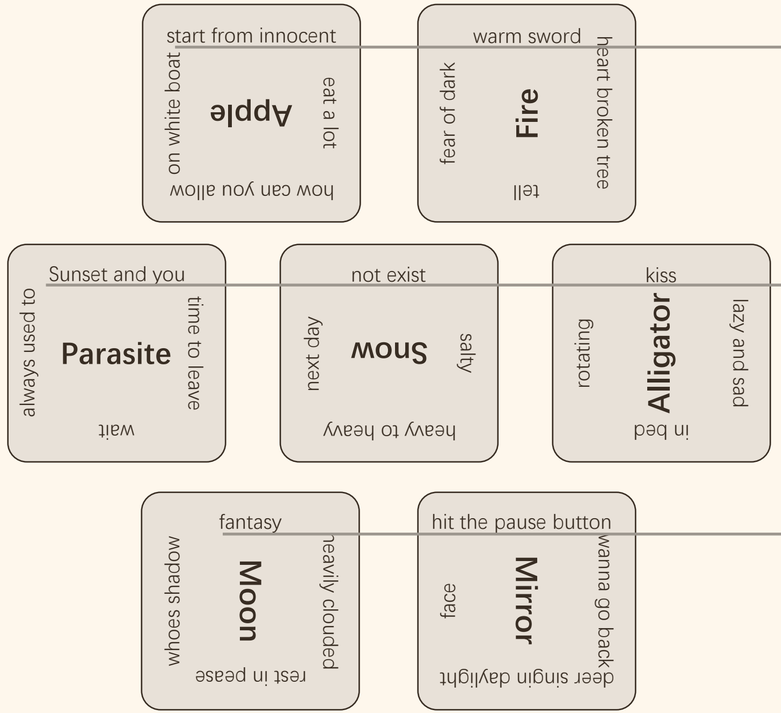




Rose and Poem the Zoo

玫瑰与诗：动物园

A print & play card game about wirting and guessing poem



Translation of cards above

Start from innocent, warm sword.

Sunset and you, not exsit, kiss.

Fantasy, hit the pause button.

Concatenate the words on card into a *verse*

A warm sword of innocence.

Sunset and you never kiss.

Imagine hitting the pause button.

Translation of the poem above

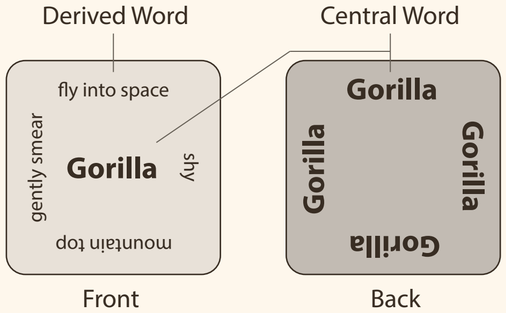
Introduction

This game is about writing and interpreting poems with a certain corpus.

Game is for 2 players. One player will use these **square cards** to write a poem, the other player will guess the specific words and phrases.

Pepare 2 sets of cards to play. The 2nd set will be the reference for guessing.

Content Links: *https://xiu0922koway.itch.io/rose-and-poem*



Play Time: 15~20 min

Word Cards

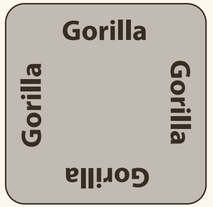
Each card has a ***Central Word***, representing a core image, and four ***Derived Words*** relating to its central image.

There are 30 cards in the game. 15 cards are about animals, like gorilla, rhino and cat.

Usage

To use a central word in poem:
please place the card with the back face up.

To use a derived word (or phrase):
place the front face up, and rotate the card until that word is facing forward.



Use *Gorilla*

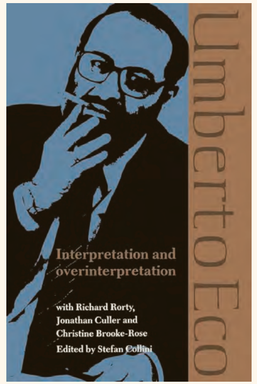
Use *Mountain Top*

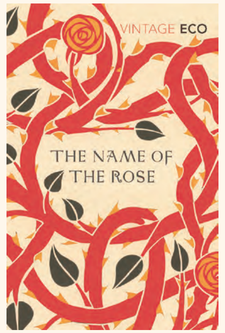
Inspiration

Eco and Interpretation Theory

From Saussure's "*arbitrariness of sign*" to Derrida's "*instability of meaning*", the uncertainty of interpretation has been widely dsicussed.

In *Interpretation and Overinterpretation*, Umberto Eco limited this uncer tainty by proposing the idea of *intentio operis*, the intention of the text.



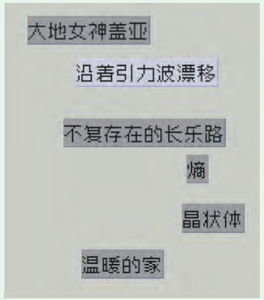


In this game, I tried to represent the intention of the Central Word with four Derived Words, as a simulation to both creating and interpreting.

Interpretation from a much wider semantic field is now transformed into guessing from four (weakly or strongly) related words or phrases, which could have more potential interpretations. This transformation provides more fun.

The name of the game is also inspired by Eco's work: *The Name of the Rose.*

Games about poem writing:



Make a Poem

詩心引力

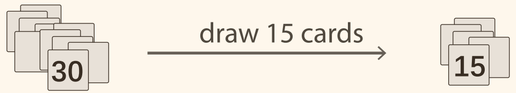
Print & Play games:

Idea of present a print & play board game was inspired by the work of ***James Ernest*** and his ***Cheapass Games.***

Gameplay illustration

0.Prepare

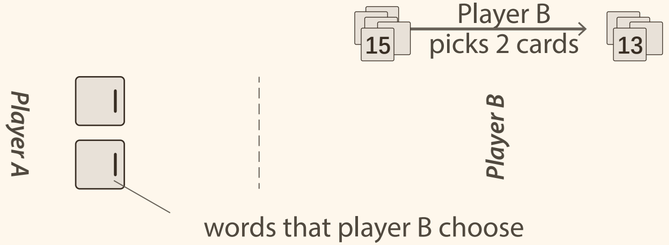
Draw 15 cards from library.



1st set of cards

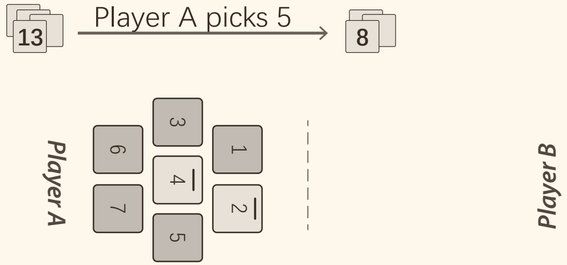
1.Specify

Player B specify 2 words for Player A to use in the poem.



3.Write a poem

Player A picks another 5 words, use this 7 words to write a poem.



The 5 cards that player A picked should face down.

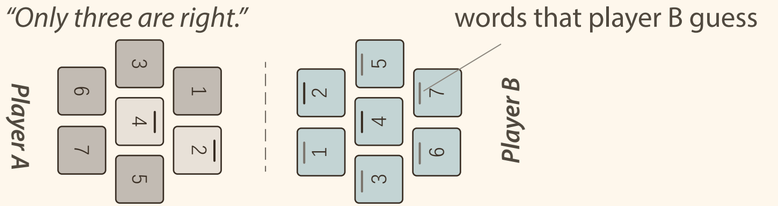
Player A could use a central word or a derived word.

The poem should have a 2-3-2 structure:
The 1st line and the 3rd line each has 2 cards, and the 2nd line has 3 cards.

4. Guess

Player B will show the guess and player A will answer how many cards were guessed right.

2nd set of cards

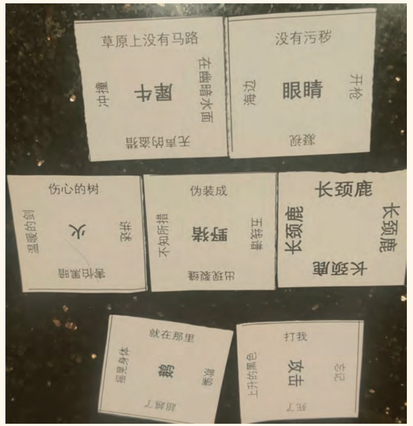


5. End

If player B guessed the whole poem within 4 tries, player B would success.

Or player B would fail.

Poems



草原上没有马路 没有污秽
No roads in savanna, no squalor.

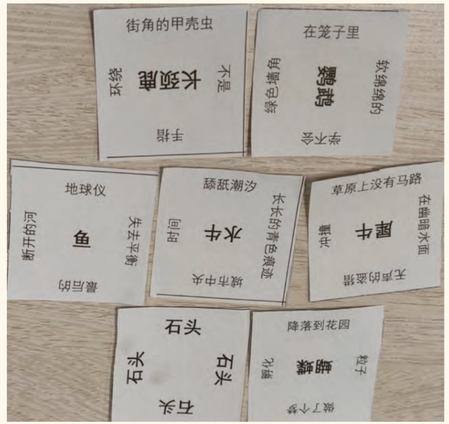
伤心的树 伪装成 长颈鹿
A heartbroken tree disguised as giraffe,

就在那里 打我
punched me right there.

现代生活 死了
Modern life is dead.

不断旋转的 猩猩 想回到从前
A whirling gorilla wish to go back,

却看不见 欺骗
but can't see the deceit.



街角的甲壳虫 在笼子里
Beetle on the street corner, locked in the cage.

地球仪 舔舐潮汐 草原上没有马路
Globe lick the tide, no roads on the grassland.

石头 降落到花园
A rock lands on the garden.

Poetry is difficult to translate, and so are the words and phrase that compose it.

Because of the differences of grammar and semantics between Chinese and English, literally translating of the corpus in cards and combining them would be probably unreadable.

Thus, I translated poems listed here by meaning.

I'm looking forward to make a English version with the help of native speakers.

The core machanism of this game is integrated in the form of the word card.

It is encouraged for player to add their own corpus or define their own rules like the structure of poem or the guess methods.

Publication

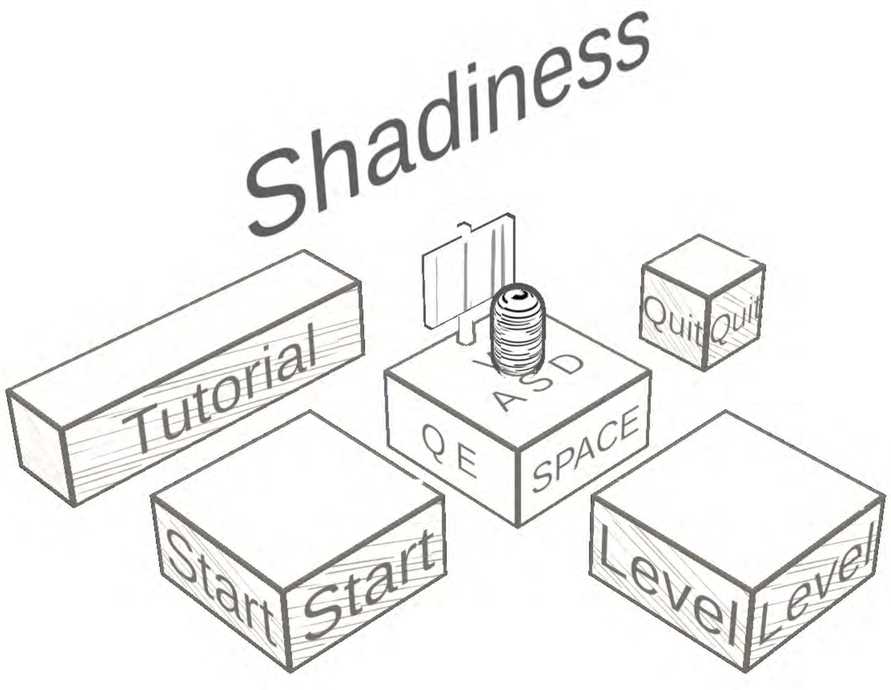
The game was published on the 2023 annual of a literature club, 水朝夕, at Zhejiang University.
The title of the annual is “Reduce the Fever”.

the cover

the board game page

the annual magazines and the inside pages

poems by players



Shadiness

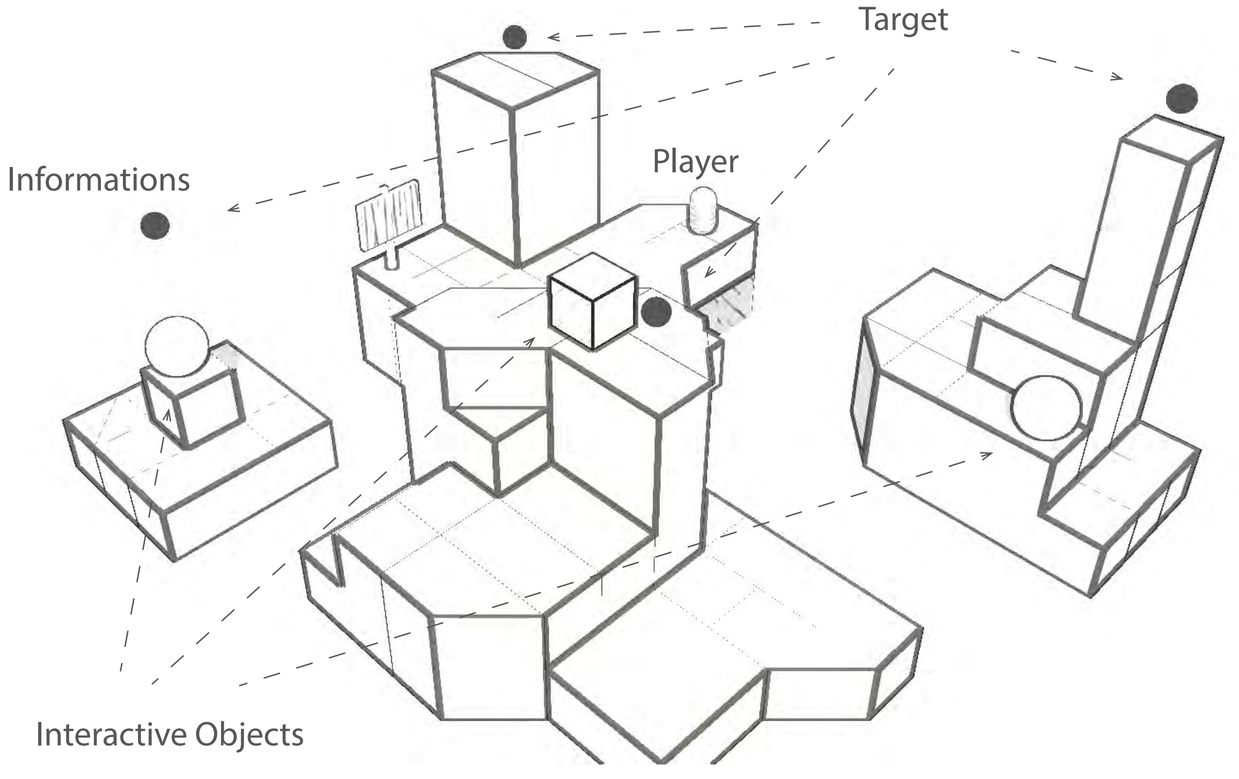
A 3D sandbox puzzle with linerated shading

Introduction

A small puzzle game about line and shade, with little sandbox-like levels.

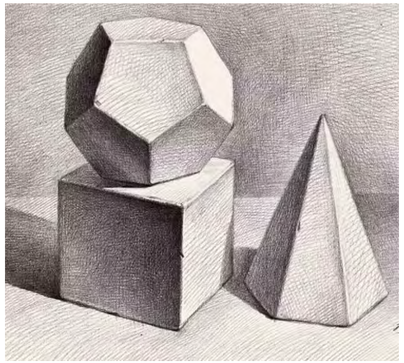
In order to get over various obstacles, player would use the ability to change lineated shades of objects and create lines.

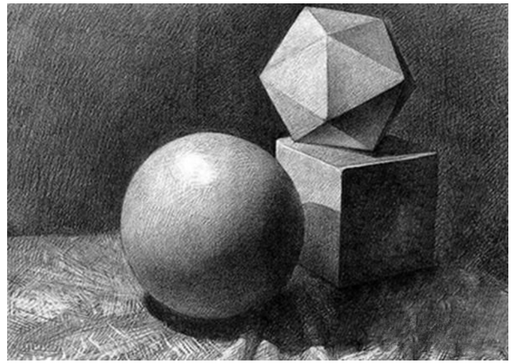
Online Demo: https://xiu0922koway.itch.io/shadlineee
Video: https://www.youtube.com/watch?v=vMuQf3GAeTs



Inspirations

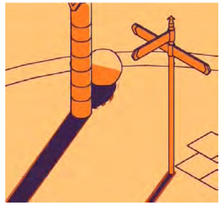
When learning sketch, I noticed shade would provide a sense of heaviness: the darker an object is, the heavier it felt to be.



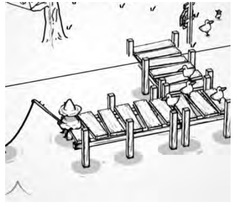


Basic Sketch Geometry

Sketching like INPR



SCHiM



TOEM

Sandbox Puzzle

Captain Toad Treasure Tracker

SuperChicken

Contributions

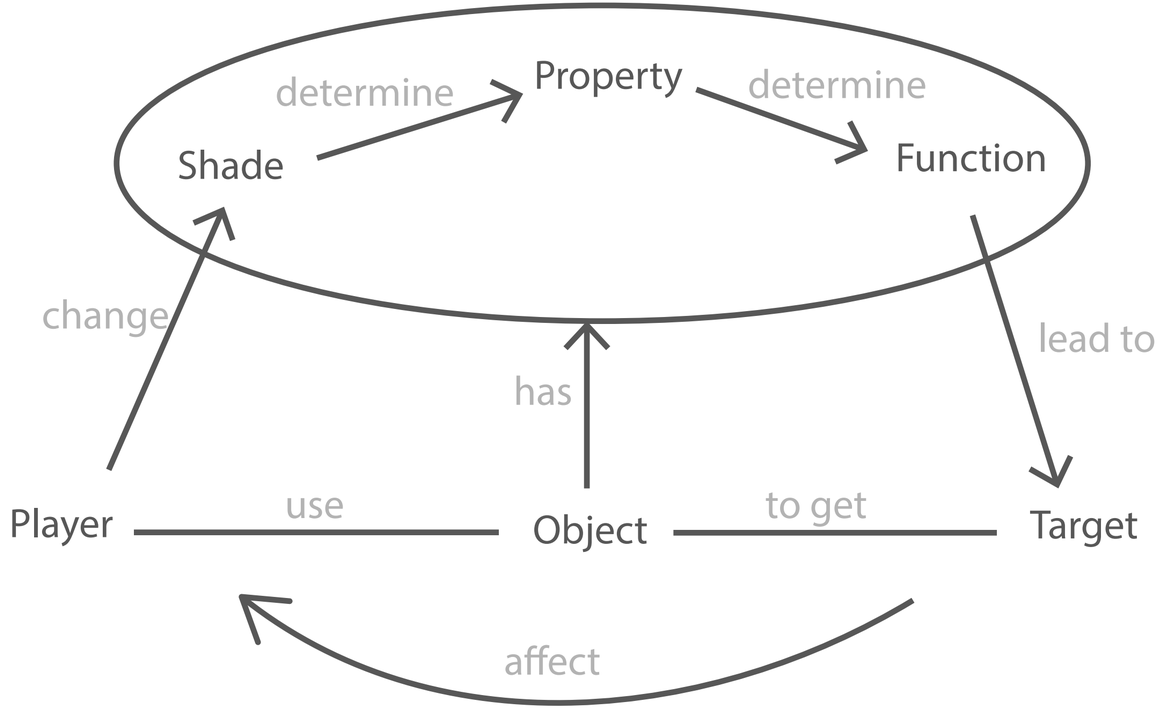
This game is solo developed using unity.

Gamplay

Shading Value

Shading Value is the basic unit in game, it represents how much shades a object has.

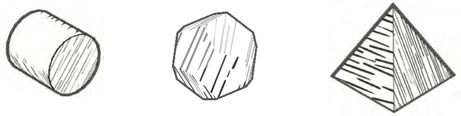
By taking and giving discrete shading value, player could change the shade of itself and other objects, and therefore change their **properties** and **functions**.



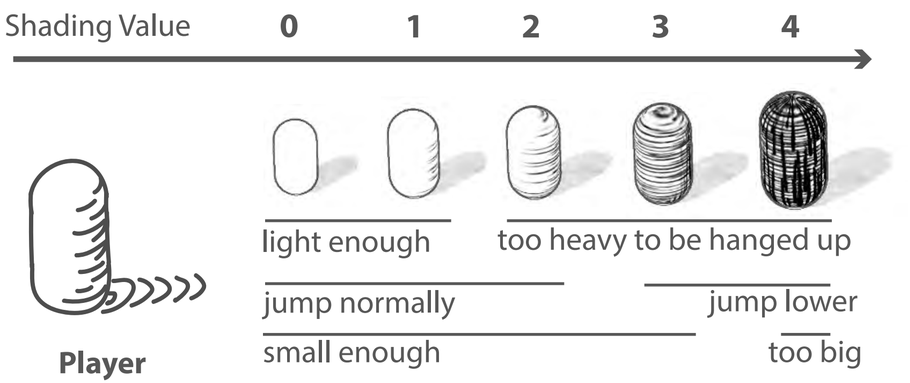
Interactive Objects

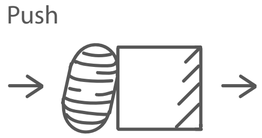
Basic objects

Functional objects



Player

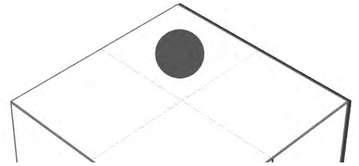




Player can only push objects "lighter" than him.

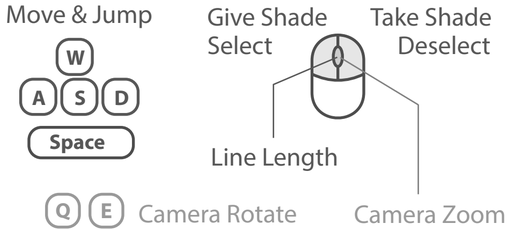
Target

Target is a dark sphere.
When player reaches a target it will absorb the target.

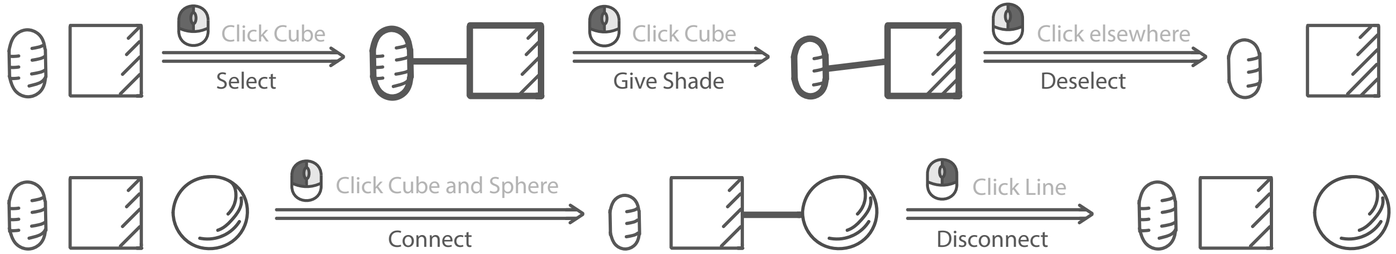


Player can only abosrb target when there are room for more shades. So the order of targets should be considering.

Input



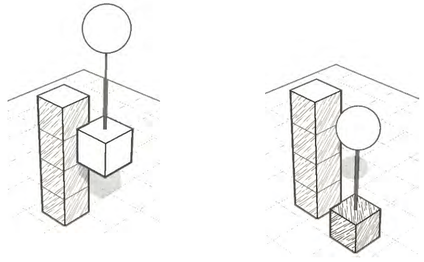
Input Sequence

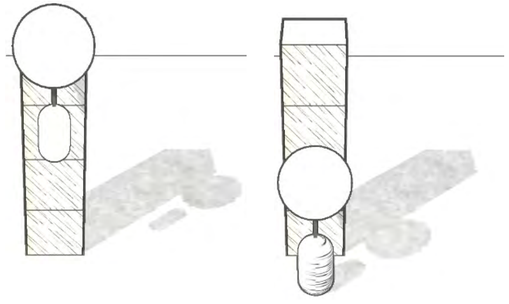


Interactive Objects

There are 5 iteractive objects in game.

Cube and ***Sphere*** are 2 basic objects, as the core puzzle solving elements through all levels.



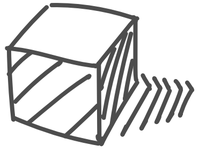


Cube could **be piled up and stood on** as an approach to **go higher**.

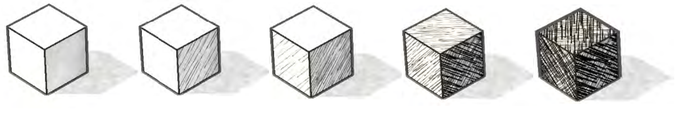
Sphere could **float up** to be a ballon and thus **carry** player and objects.

The size of these two object is slightly smaller than 1 unit in game.

Shading Value **0** **1** **2** **3** **4** **0** **1** **2** **3** **4**



Cube



light enough — too heavy to be hanged up

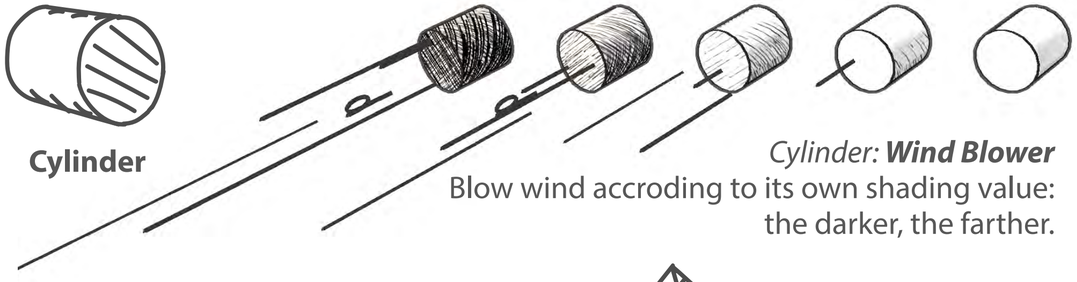
pushable — immovable

Sphere

float up — light enough — too heavy to be hanged up

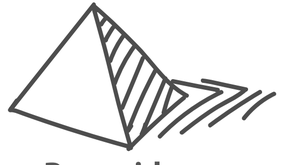
pushable — immovable

Shading Value 4 3 2 1 0 0 1 2 3 4



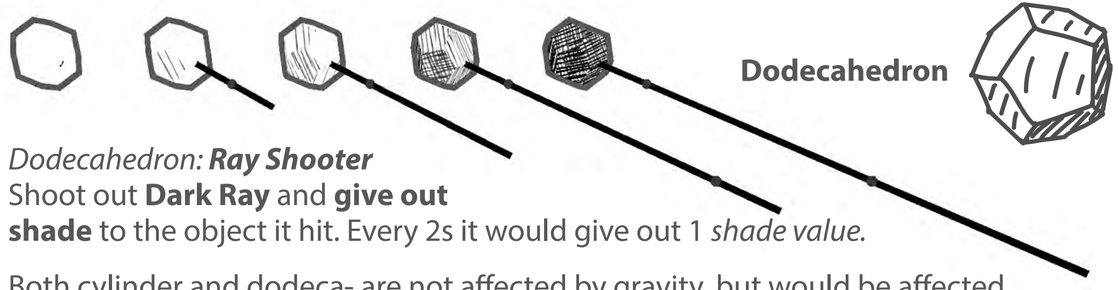
Cylinder: ***Wind Blower***
Blow wind accroding to its own shading value:
the darker, the farther.

Cylinder and ***Dodecahedron*** and ***Pyramid*** are functional objects, for player to overcome more barriers.



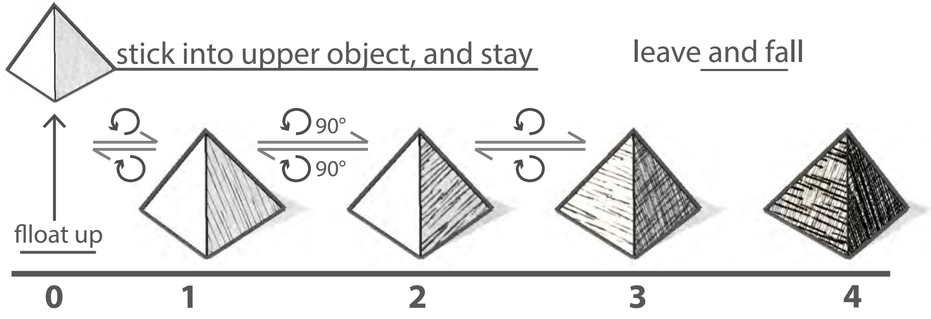
Pyramid: ***Rotater***

Rotate 90° when shade value changes. If shade value decrease, pyramid will rotate clockwise; if the shade value increase, it will rotate anti-clockwise. And Pyramid would **stick into** object its spike touches and **rotate along** with the object, when it is not too dark and heavy.



Dodecahedron: ***Ray Shooter***
Shoot out **Dark Ray** and **give out shade** to the object it hit. Every 2s it would give out 1 *shade value*.

Both cylinder and dodeca- are not affected by gravity, but would be affected by other cylinders or pyramids.

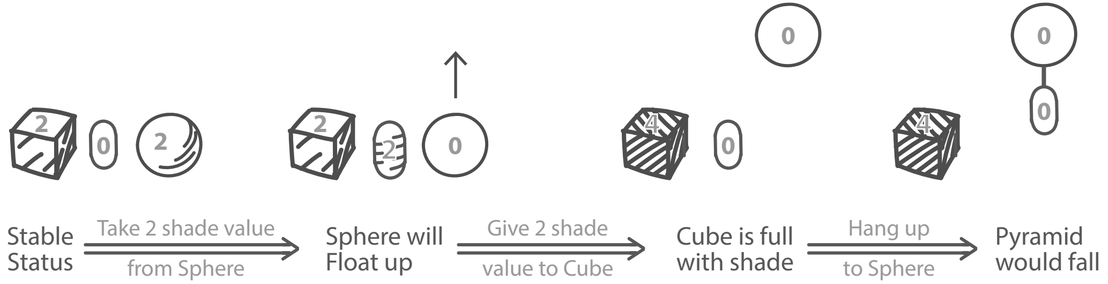


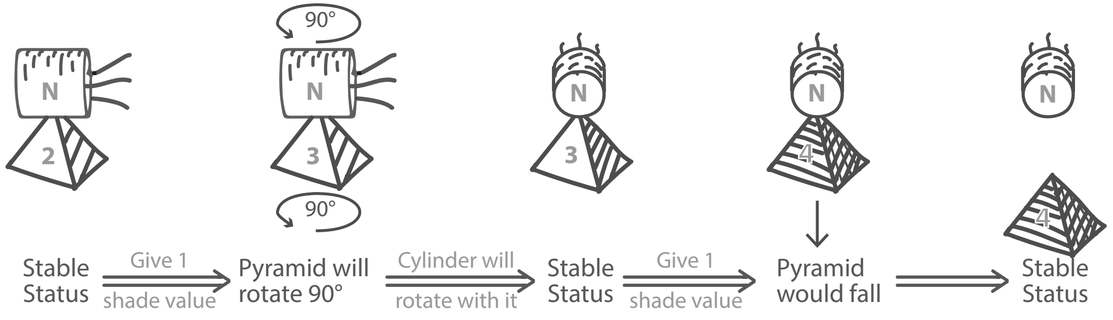
mass properties same as Sphere

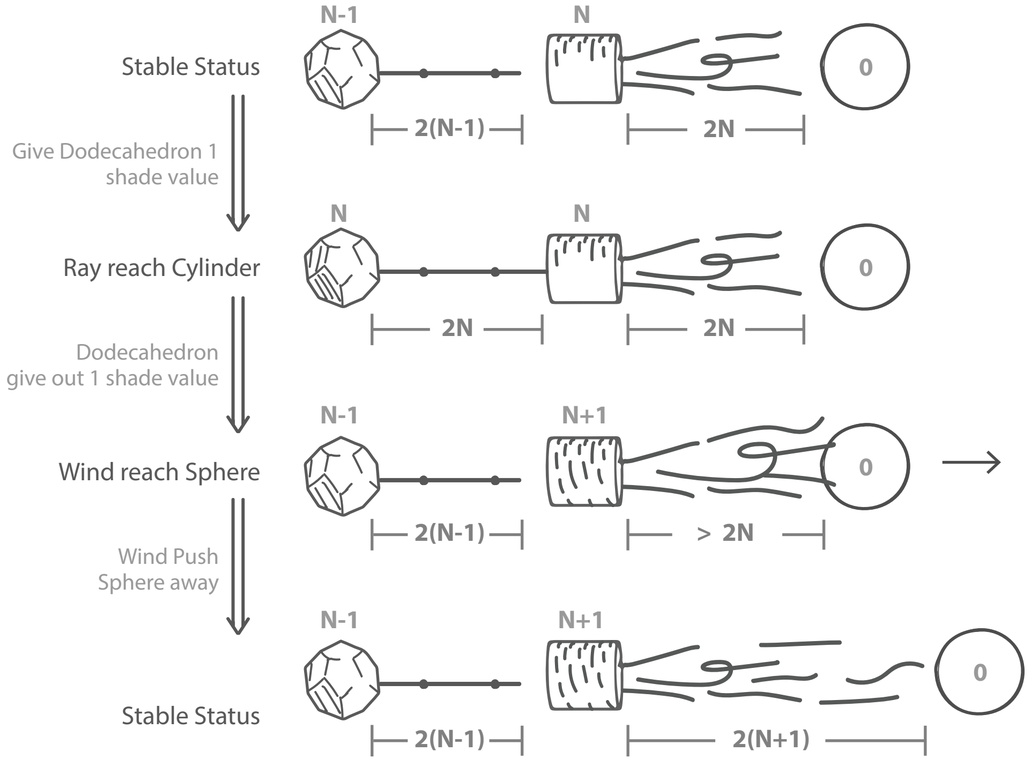
Object Functions

Illustration of functions and combination of objects.

N and numbers represent shade values or distance.



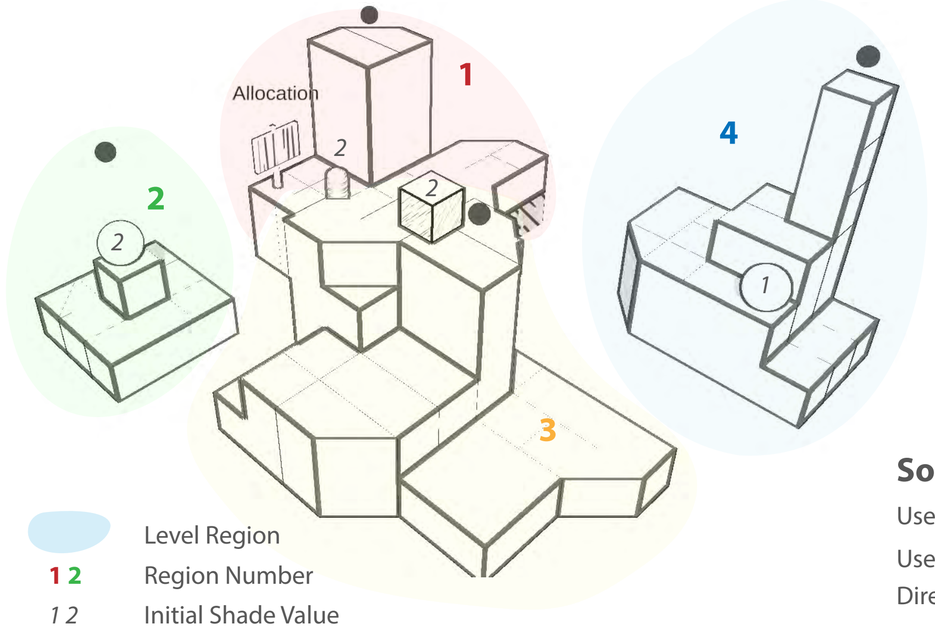




Level

Example: level 4

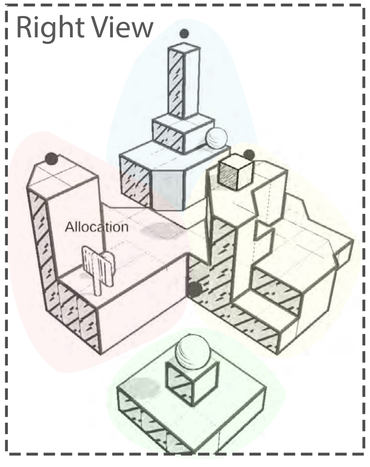
Barriers: ***Shade Limit*** + Height + Distance



Level Region

1 2 Region Number

1 2 Initial Shade Value



Solution:

Use sphere in 2 to reach targets in 1 and 2.

Use sphere in 4 to reach target in 4.

Directly reach targets in 3.

Shade Values Limit:

4 objects could contain shade value:

Player, Sphere, Cube and Sphere.

Their shade values at the beginning respectively:

2, *2*, *2*, *1* (a total of *7*) .

4 **targets** in the level, each provide *1* shade value.

So the ***shade values need to be contained*** is:

7+4 = 11.

Theoritically, the shade value capacity is:

4+4+4+4 = 16 > 11.

However, if targets in region 1,2 or 4 is the last to reach:

(1) the sphere's shade value need be 0 (to float),

(2) and player's shade value need less than 1 (to hang up).

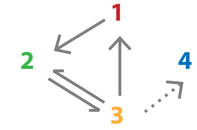
So the shade value capacity now is:

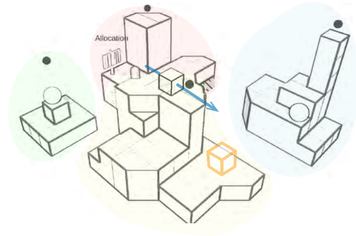
1+0+4+4 = 9 < 11.

The capacity is lower than the need.

Therefore target in 3 should be the last to reach.

Pass-ability between 4 regions at the beginning, dotted line with arrow for pass by spheres.





To reach region 4, Cube in 3 need to be pushed to specific position, in order to be:

(1) container of shade value;

(2) anchor of Sphere in 4

Shader

Sketch Style Shader is referring the article
"Real-time hatching", Praun et al. 2001 on SIGGRAPH.