

DESIGN DOCUMENTATION

Koko on the Road

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Story Development

Level Design

Game Mechanics Design

UI Design

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1. OVERVIEW

Koko on the Road is a first-person virtual reality game combining adventure, exploratory and educational games. The player incarnates as a white stork Koko, collecting foods, dodging natural enemies, avoiding traps from human beings, and finally completing the migration from South Africa to the Black Sea. Meanwhile, knowledge of biology and geography can be acquired when the player makes choices, explores circumstances, interacts with non-player characters (NPC), and answers certain questions during the journey. This game intends to raise awareness of the younger generation to establish a healthy connection to nature.

The story revolves around a group of white storks living on the grasslands. Spring is coming, and these white storks plan to migrate to the Black Sea. Unfortunately, human beings try to hunt them, and they flee frantically. In the chaos, young stork Koko is left, for he is playing in another place on his own. In this way, Koko is separated from his family members. Although he is sad and perplexed, he still decides to set out by himself to find his family. On the way, he learns to be independent and grow.

The ultimate goal of this game is that Koko should accomplish the migration and reach the destination. By proceeding the game, players can gradually advance the plot, and fulfill their curiosity as well. Furthermore, they are enabled to experience the personal story of Koko and build an intimate relationship with him spiritually. For Koko is a teenage bird in the same age group as the player, it may cause some resonances among players about adolescence.

This game is distinctive in aspects of technology, interactive design, knowledge it wants to impart, and value it intends to convey. In terms of techniques, Koko on the Road employs virtual reality skills. With the addition of sophisticated graphic design, fascinating maps, exquisite acoustic effects, and first-person perspective, players can attain an immersive and dreamlike game experience. Meanwhile, they can gain insights into how a white stork fights against harsh natural conditions and knowledge about the food chain.

Furthermore, the gameplay and interaction are elaborately designed to assist the player to comprehend knowledge simply and interestingly. To be more specific, the player will learn things not by following steps or rote memorization but via repeated trials. Thus,

they can actively participate in making decisions, choices, and mistakes. Afterward, the knowledge can make a profound impression in their minds and they will also be aware of how to apply the knowledge practically.

More importantly, the intention of this educational game is not to teach the player how to perform well in a school examination but to cultivate comprehensive qualities and abilities. Things players can obtain from the game are not confined to biology or geography. They can also develop valuable traits, including courage, confidence, agility, and critical thinking through interacting with NPCs.

Koko on the Road mainly targets children in the 9 to 13 age bracket who are interested in biology and geography, have a great fancy for nature and fundamental abilities of reading comprehension. Although it contains many cute cartoon figures and selects easily understood words and language to describe and explain things, it still requires certain comprehension skills to solve problems. Therefore, the player is expected to be at least older than 9 years old. Moreover, the game is designed for PC, Mac, and PlayStation.

To sum up, Koko on the Road has a delicate plot, sophisticated visual elements, and well-designed tasks, which allows the player to grow in both intellectual and spiritual aspects. As a group with two professional programmers and four visual artists from Digital Media Arts, we strongly believe the game can be greatly realized.

2. GAME MECHANICS

The player should play the role of Koko, make him move and click by easily controlling the hand shank. The ultimate goal is to accomplish the migration and reach the destination to get reunited with Koko's family, with health value greater than 40 points. These two values are directly related to life and motion ability of the player. When health value is lower than 40 points, the motion speed will decrease by 50%. When health value is lower than 20 points, the motion speed will decrease by 80%. When health value drops to 0, Koko is dead, and the player should restart the game. There are two methods to gain health value. The first one is eating food, which will be further discussed in the following part. The other one is rest on site. 30-second rest regains 20 points, 60-second rest regains 40 points, and so on. The health value will also be consumed by 1 point per second when the game starts.

In total, there are four different levels, each of which has a distinct territory and map. They are grassland, desert, industrial district, and sea respectively. Level's degree of difficulty builds up step by step from level 1 to level 3 with diverse obstacles, while level 4 is a happy ending without too many obstacles. Only when finishing the previous level can the player unlock the next level. Otherwise, territory of the next level is invisible on the map.

Other species (foods, enemies, and competitive species), climatic phenomenon (e.g. rain, sandstorm etc.), landforms (e.g. river, oasis etc.), and objects (e.g. electrical poles, rubbish etc.), will appear on specific spots of the territory for each level (as it is shown in different illustrations of each level). Player can have interactions with all these entities. The following section explains specific events occur in each level.

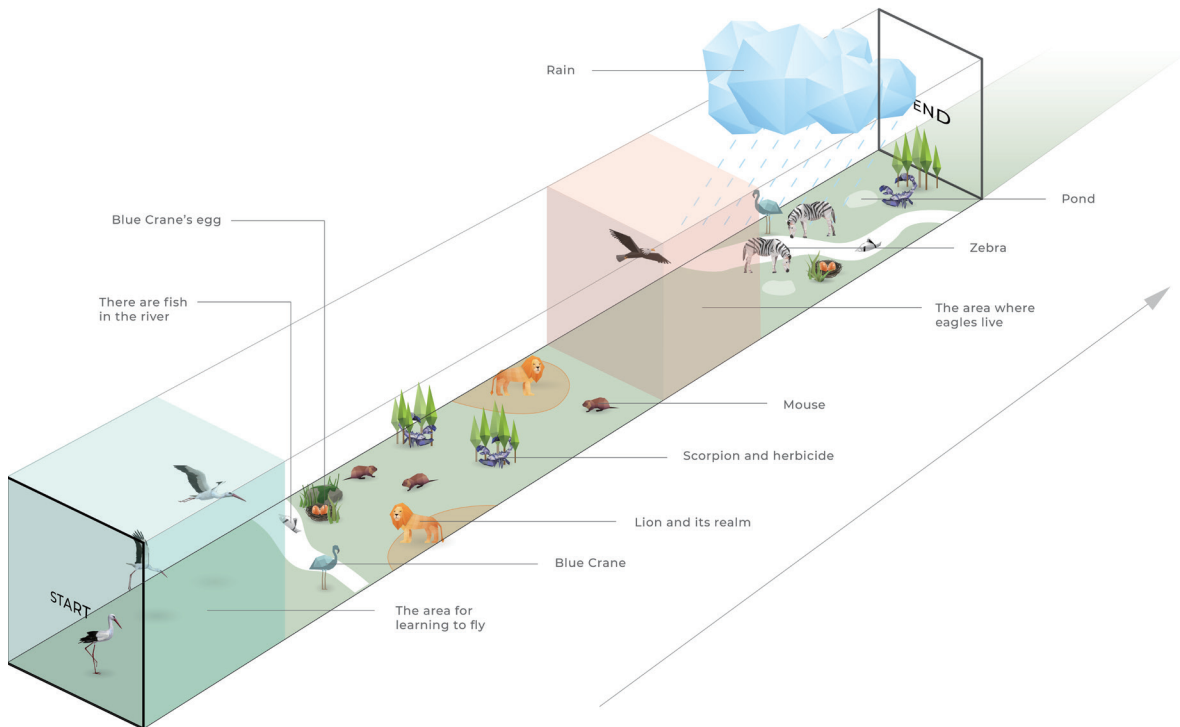
Level 1: Grassland

In this level, the player will go through a series of tutorials about basic operations in this game, including how to walk, run, and lift.

☐ **Player Perspective**



□ Design Sketch



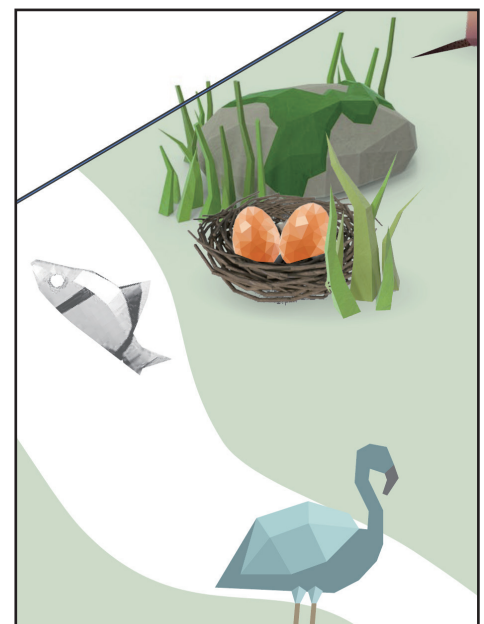
Entities players will encounter are as follows:

□ Other Species -- Food

1/Blue Crane's egg

Blue crane's eggs are in the nests of blue cranes. If there is no adult blue crane near the nest (in the circle of radius ten with the nest as the origin), the player can steal eggs and eat. The number of eggs is a random number between 1 to 5. Every egg can add 20 points to satiety.

Note: If adult blue crane is near the nest (in the circle of radius ten with the nest as the origin), it will attack (hit and scream) the player. If the player is hit by the adult blue crane, Koko will lose 20 points of health. When Koko escapes, he should move out of the circle, then run and take off.



2/Mouse

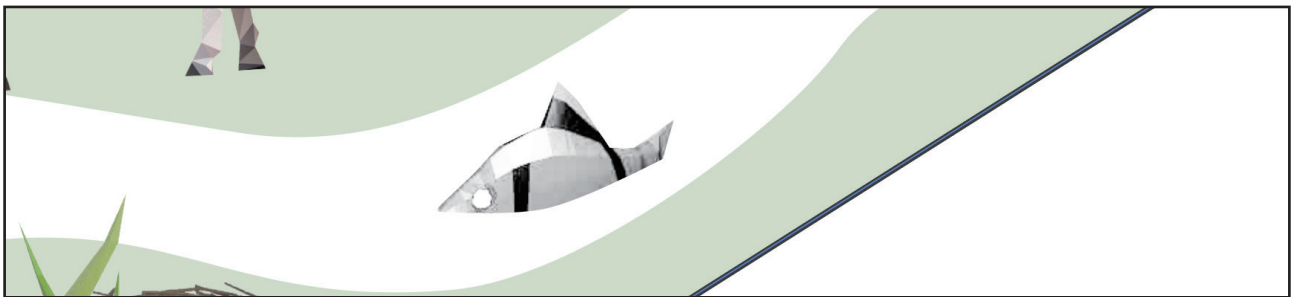
Mice run very fast. The player needs to chase to eat them. Every mouse can add 15 points to satiety.

Note: Places where mice appear are also places scorpions live. Koko should be careful not to touch scorpions.



3/Fish

Fish only live at ponds and in rivers with water. If the ponds or rivers do not contain water, there will be no fish. Fish are afraid of blue cranes and zebras. If there are blue cranes or zebras drinking water besides the rivers or ponds, there will be no fish. Every fish can add 10 points to satiety.

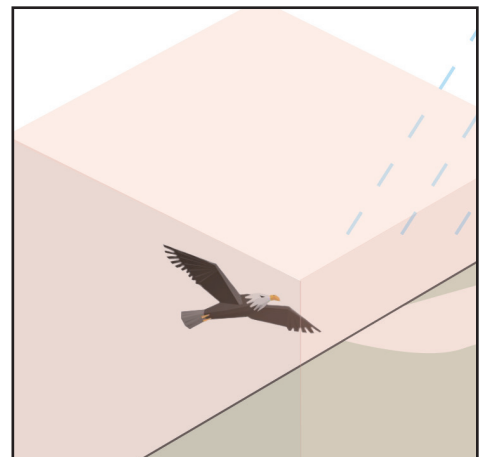


❑ Other Species -- Enemies

1/Eagle

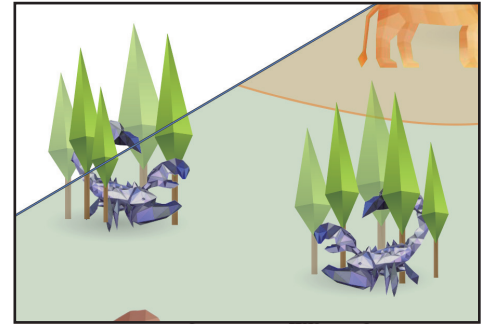
There is no mouse where Eagles appear. If an eagle discovers Koko (in the circle of radius ten with the eagle as the origin), it will chase Koko. The player should run away as soon as possible. If the player is hit by the eagle, Koko will lose 50 points of health.

Note: When satiety value is lower than 20 points, Koko's motion speed descends, and it is double chance that he will get caught.



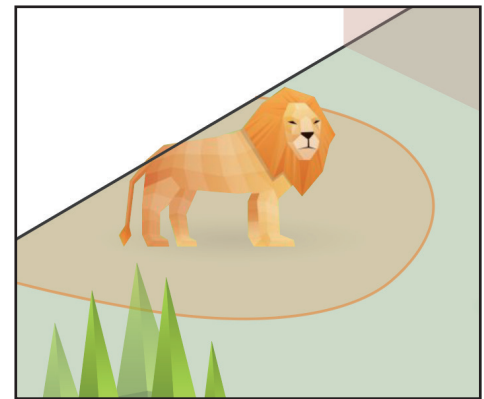
2/Scorpion

Scorpions are poisonous, so Koko must not touch them. If touched by scorpions, Koko will lose 20 points of health. If Koko get poisoned because of scorpions, he can try to find herbicide from the surroundings within 15 seconds. If Koko manages to do so, his health level can return to what it is before getting poisoned.



3/Lion

Lions divide lines between their realms. There are a male and female lion in each realm. If Koko enters lions' realms (in the circle of radius twenty with the lion as the origin), lions will attack him by pouncing (lions can only pounce animals which are 3 meters higher than them). If the player is hit by the lion, Koko will lose 40 points of health. Koko should accelerate or fly higher to get away from lions.

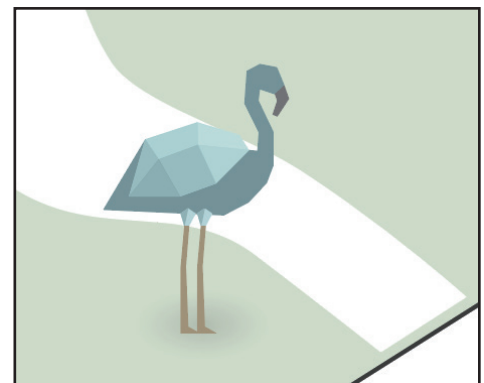


Note: Lions' realms are not displayed in the map, which means the player can only realize when they enter the realms.

□ Other Species -- Competitive Species

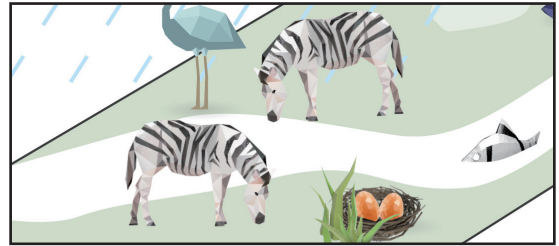
1/Blue Crane

There are many blue cranes, which eat similar foods as Koko does. They may stay near their rests or eat fish near rivers. When the game begins, blue cranes are eating fish near rivers. When they are eating fish, Koko cannot find fish. After finishing (10s), they will fly back to their nests. They will stay near the nests for 10 seconds, then go back to the river again.



2/Zebra

When the game begins, 2-3 zebras are near the river. Some of them stands beside the river, while others are drinking water. If they are drinking water (5s each time), Koko cannot find any fish in the river.



☐ Climate Phenomenon

1/Rain

The raining area appears at the end of the game as shown in the illustration. When players are crossing the raining area, they should shelter under the tree. Each rain lasts 10 seconds. Rain can add water to ponds which originally do not have water.

Note: If players do not find a shelter, visibility will decrease by 50%, increasing the risks of being attacked by enemies.



☐ Landform

1/Pond

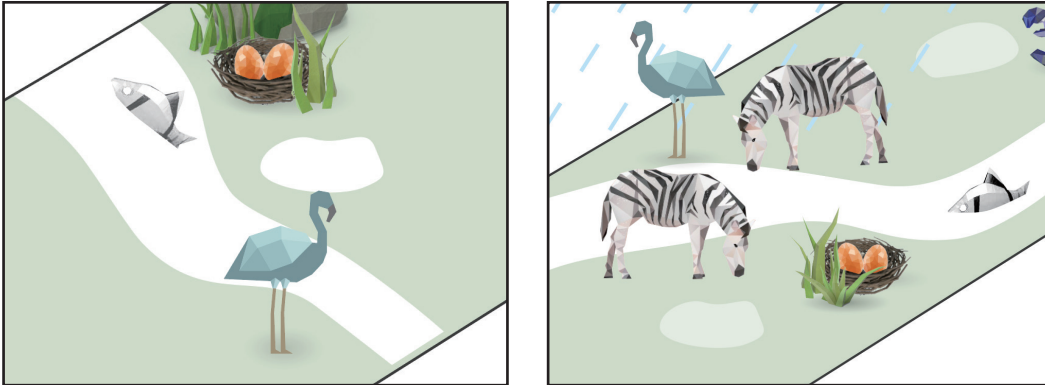
There are three ponds.

Pond1 has water and one fish in it at the beginning of the game. When the player arrives at this place (in the circle of radius fifteen with the pond as the origin), the temperature increases, and water starts to vapor. If the player stays here for ten seconds, water in the pond will disappear. As soon as the water disappears, the fish disappears either.

Ponds2&3 are ponds without water at the beginning of the game. Only raining can add water to them. When there is water inside the pond, there will be fish in the pond as well.

1/River

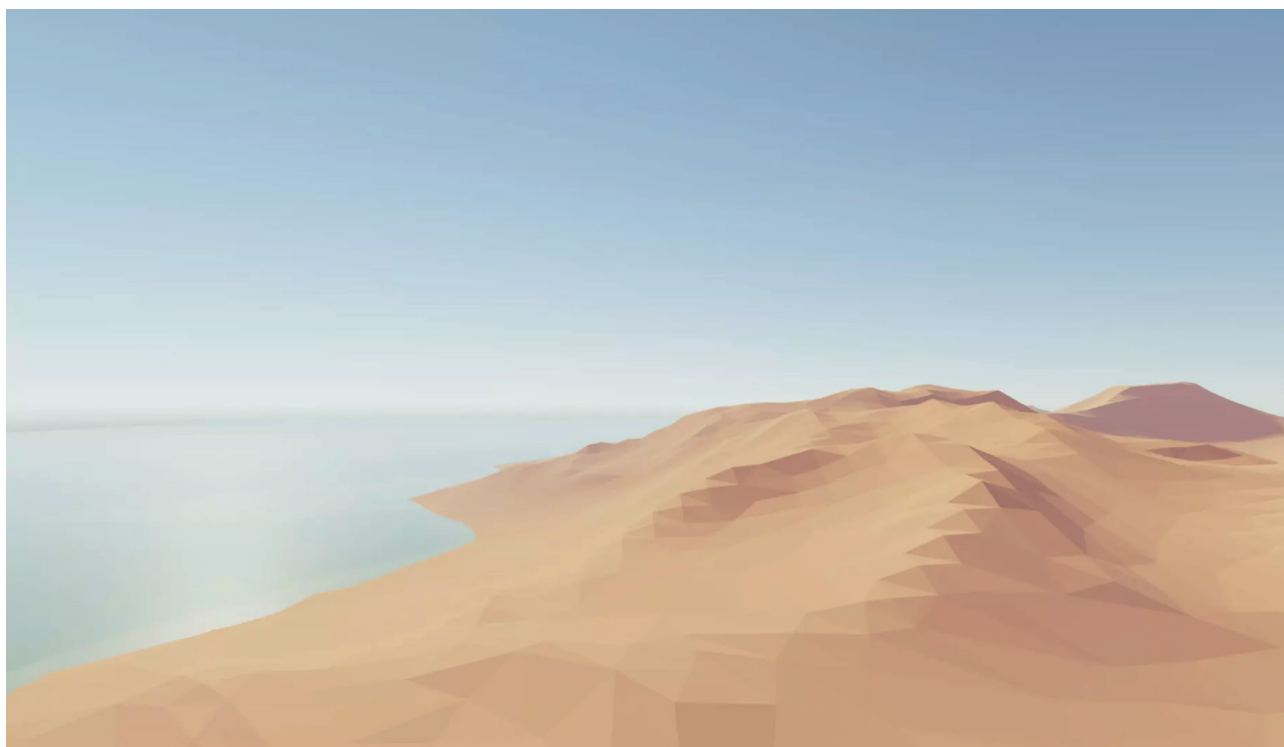
There are two rivers which always have water and fish inside them. When blue cranes and zebras is near the river (in the circle of radius ten with the river as the origin), Koko cannot see any fish inside the river. After these other creatures leave for 10 seconds, fish appear again in the river.



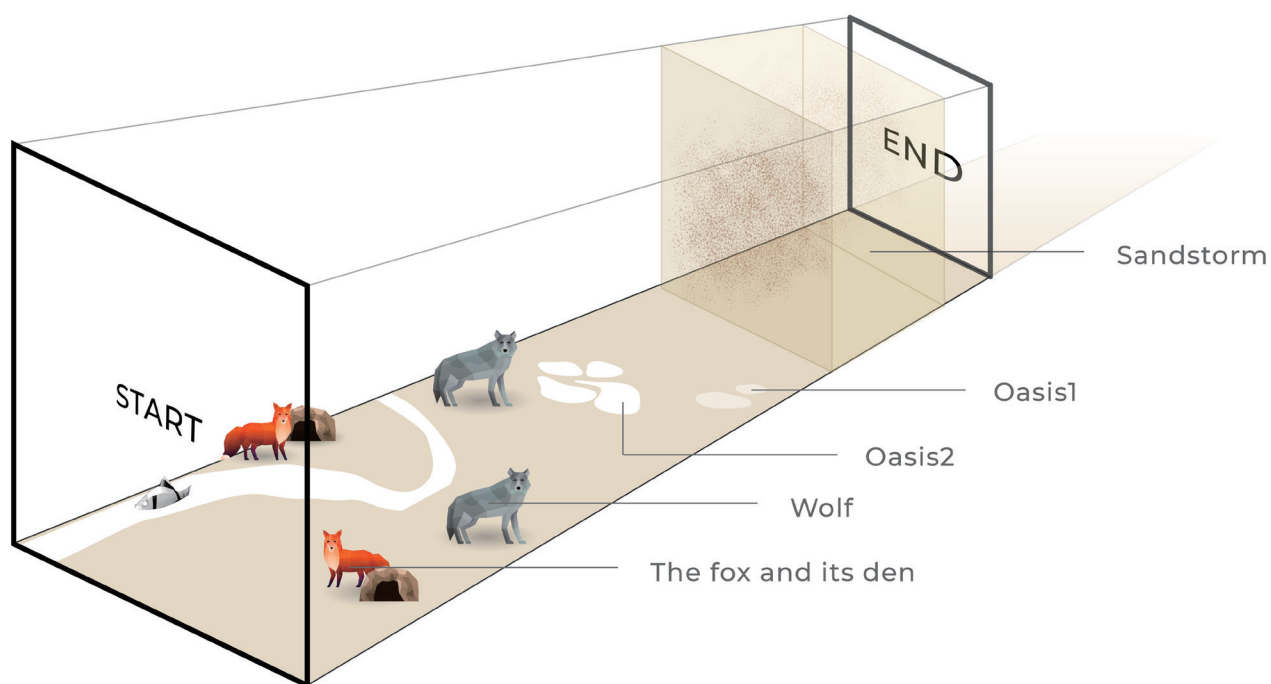
Level 2: Desert

In this area, there is not too much food for Koko to eat. However, new kinds of enemies appear, and this can be challenging to players. Moreover, due to tough climate in desert, the speed health value drops is 20% faster. They must learn new skills to deal with these problems.

☐ Player Perspective



☐ Design Sketch



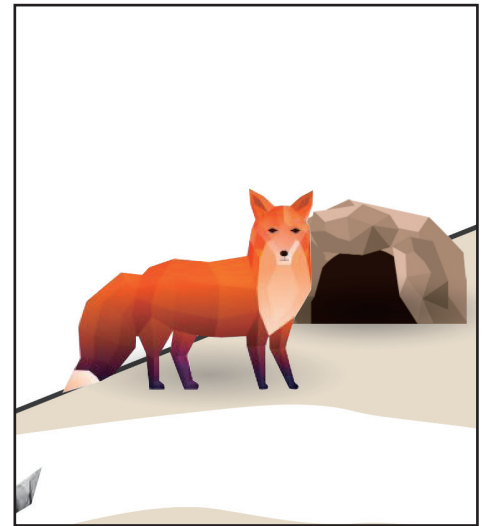
Entities players will encounter are as follows:

❑ Other Species -- Enemies

1/Fox

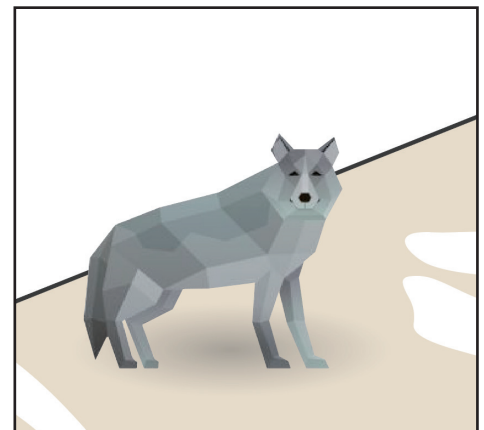
Foxes can dig holes on the ground. Only when Koko is near the hole (in the circle of radius ten with the fox as the origin) can foxes appear. Foxes can pounce animals 0.5 meters higher than them. Every 5 seconds longer the Koko is near the hole, one more fox appear on the ground. If the player is hit by the fox, Koko will lose 20 points of health.

Note: When satiety value is lower than 20 points, Koko's motion speed descends, and it is double chance that he will get attacked.



2/Wolf

Wolves are wandering near the river. They are very clever and swift. They will prevent Koko from drinking the water. When the wolf sees Koko (in the circle of radius ten with the wolf as the origin), it will chase Koko. Thus, Koko should fly to the opposite direction and attract the wolf, then rapidly fly back to the river to drink water. Wolves can also pounce animals 1 meter higher than them. If the player is hit by the wolf, Koko will lose 30 points of health.

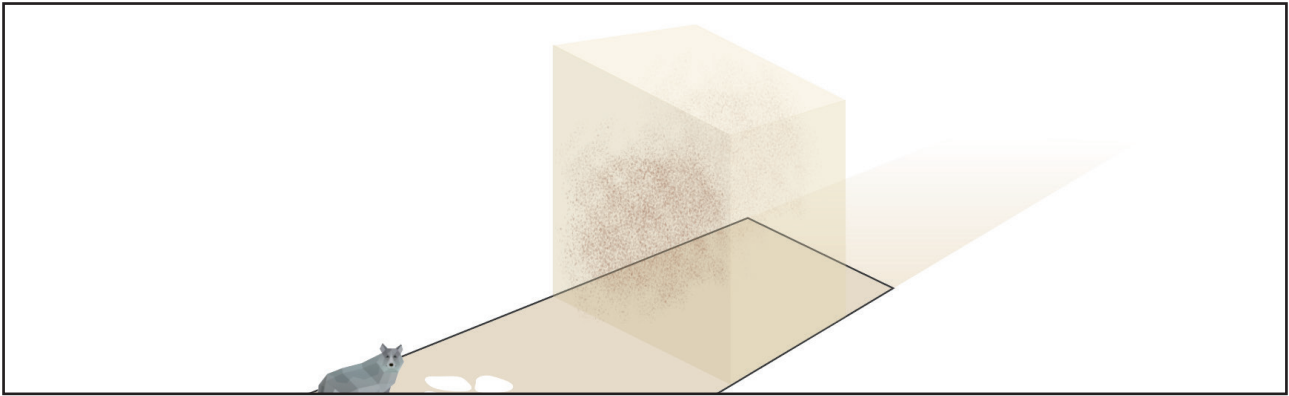


❑ Climate Phenomenon

1/Sandstorm

The sandstorm area appears at the end of the game as shown in the illustration. When players are crossing this area, their health value keeps dropping. The maximum value

of dropping is 30 points. It at least takes about 20 seconds to cross this area. Image becomes darker by 50% within the sandstorm area. When at 3, 9, 15, 19, and 26 second, the direction will drift off the original course by 30 degrees. The player needs to detect the right direction.



□ Landform

1/River

The river occupies half of the map. It is the only place for Koko to gain health value in this territory. If the player is standing in the river, the health value regains 5 points per second. However, the player can only stand in one segment of the river for up to 10 seconds, and the river has only 3 segments.

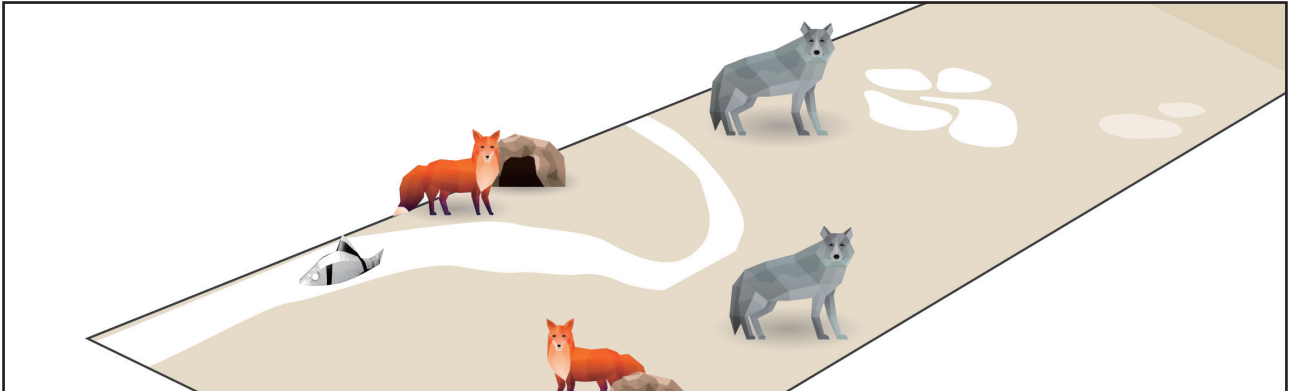
1/Oasis

There are two kinds of Oasis, which are at specific places on the map. The genre of oasis will change randomly every 15 seconds. There are water ponds in oasis, which allow Koko to regain health value for unlimited time.

Oasis1 is dry, which has two water ponds in total. If the player is standing in the pond, the health value regains 2 points per second. There are no enemy here.

Oasis2 is fertile, which has four water ponds in total. If the player is standing in the pond, the health value returns to 100 points for 10 seconds. However, there are one human being here. If the player is caught by the human being (in the circle of radius ten with the human as the origin), Koko is dead and game over.

Note: Initially, the game will not tell the player that human being is threatening.



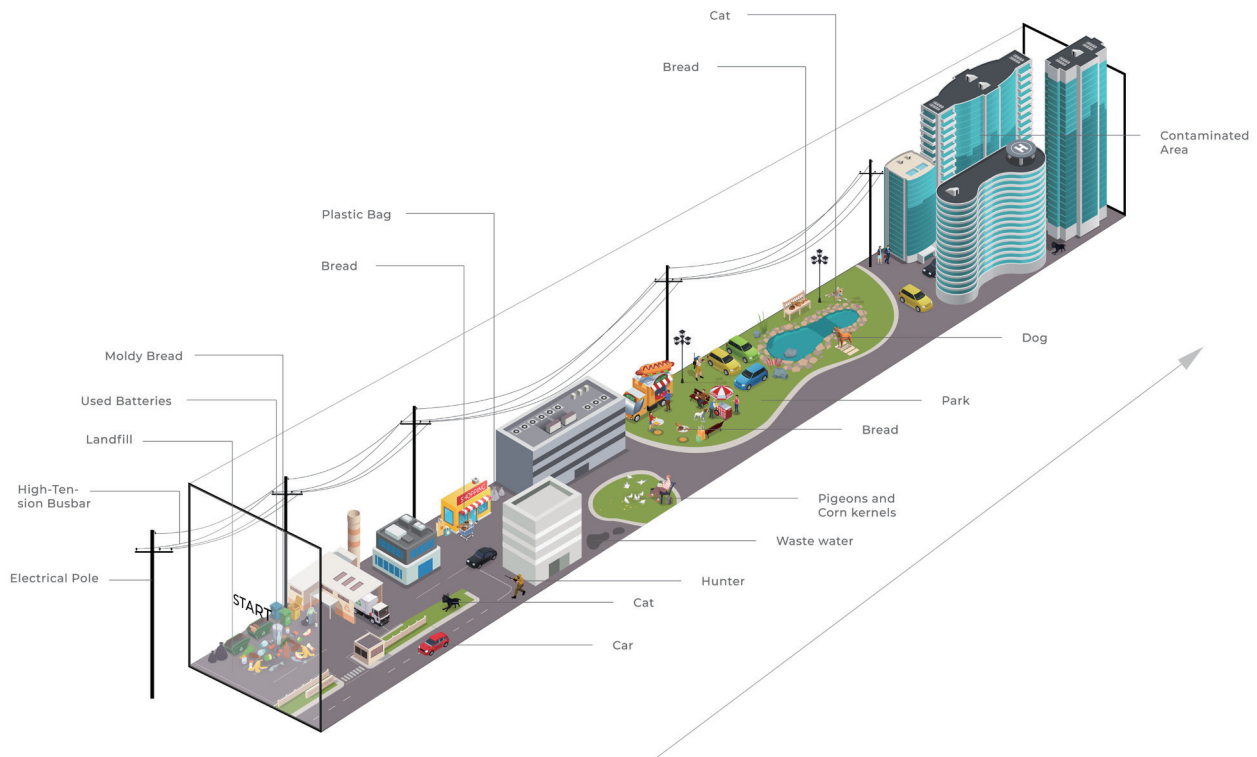
Level 3: Industrial Area

Koko is hit by an electrical pole first and falls into a landfill at the beginning of this level, which also makes his health value drops to 40 points. As a result, players should begin with finding food inside the landfill. New obstacles including rubbish and electrical poles appear in this territory. Players will be taught how to avoid crashing into electrical poles via controlling the hand shank. The health value consumption speed returns to default at this level.

☐ **Player Perspective**



□ Design Sketch



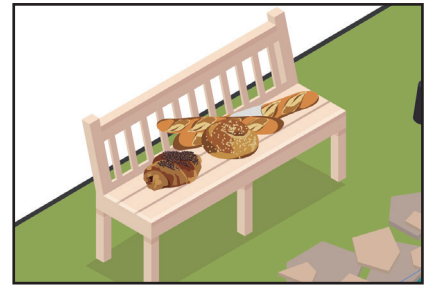
Entities players will encounter are as follows:

□ Food

1/Bread

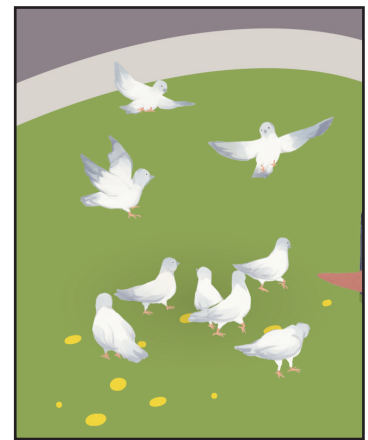
Bread can be found in the landfill and will also randomly appear along the roads and at parks inside the city. If there is no adult human being or other animals near the bread (in the circle of radius ten with the bread as the origin), the player can pick up the bread. Every piece of bread can add 20 points to satiety.

Note: If there is a human being near the bread (in the circle of radius ten with the bread as the origin), he or she will attack the player. If there are cats or dogs near the bread (in the circle of radius five with the bread as the origin), they will attack Koko by pouncing.



2/Pigeon Food

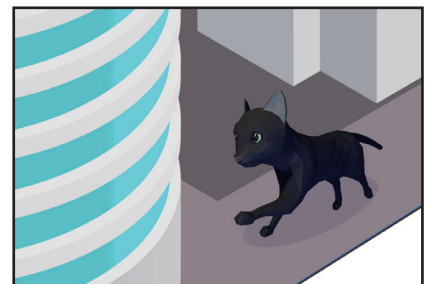
Human being will throw pigeon food to the pigeon randomly along the roads and at parks inside the city. However, it's very challenging to get these foods. If Koko is near the pigeon food for 3 seconds (in the circle of radius ten with the pigeon food as the origin), human beings will try to hit Koko. If there is a pigeon near the food (in the circle of radius five with the pigeon food as the origin), it will get angry and peck Koko. Every 3 seconds longer the Koko is near the pigeon food, one more pigeon appear in the surrounding.



❑ Other Species -- Enemy

1/Cat

Cats are wandering along the road. If a cat sees Koko (in the circle of radius ten with the cat as the origin), it will pounce him. Cats can pounce animals which are 0.5 meters higher than them. If Koko is pounced by a cat, he will lose 20 points of health.



2/Dog

Dogs are wandering in the park inside the city. If a dog sees Koko (in the circle of radius ten with the dog as the origin), it will pounce him. Dogs can pounce animals which are 1 meter higher than them. If Koko is pounced by a dog, he will lose 25 points of health.



3/Human Being

Human beings will hit Koko. A red circle of radius1 will aim at the player. The player needs to avoid the red circle by moving. If the player is within the red circle for 3 seconds, Koko will be hit by the human being, Koko will lose 40 points of health. Human beings can aim at animals which are 20 meters away from them.



☐ Other Species -- Competitive Species

1/Pigeon

Pigeons live on foods thrown by human beings in the city. They appear along the roads and at parks. If Koko eats their food, they will become extremely angry and peck Koko. A pigeon can peck animals which are 0.5 meters away from them. If Koko is pecked by a pigeon, he will lose 10 points of health.



□ Landform

1/Park

There is only one park inside the city, which is at a specific place on the map. There are cars parked in this park. The location of the cars will change randomly every 15 seconds. There are lakes in parks, which allows Koko to regain health value. If the player is near the lake (in the circle of radius ten with the lake as the origin), the health value gains 10 points per second. Koko can only stay near the lake for up to 5 seconds at a time. If there are cars parked near the lake (in the circle of radius fifteen with the lake as the origin), Koko can only gain 5 points per second.

Note: This place is very complicated with lots of dogs, human beings, and pigeons.



□ Object

1/Used Batteries

Batteries are poisonous to Koko. They mainly appear in the landfill. They can be picked up by the player. However, if the player treats it like a food, Koko will lose 60 points of health value.



2/Moldy Bread

Bread is poisonous to Koko. It randomly appears in anywhere inside the city. It can be picked up by the player. However, if the player treats it like a food, Koko will keep losing 5 points of health value per second for ten seconds unless they find any eatable food within these ten seconds.



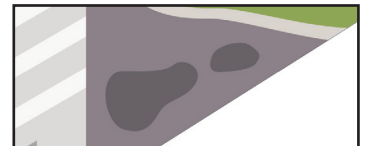
3/Plastic Bag

Plastic bags are poisonous to Koko. They randomly appear in anywhere inside the city. They can be picked up by the player. However, if the player treats it like a food, Koko will keep losing 10 points of health value per second for ten seconds unless they find any eatable food within these ten seconds.



4/Waste Water

Waste water randomly appears in the lake at the park. They are dark grey. If Koko drinks this, he will immediately die, and the player should restart this level.

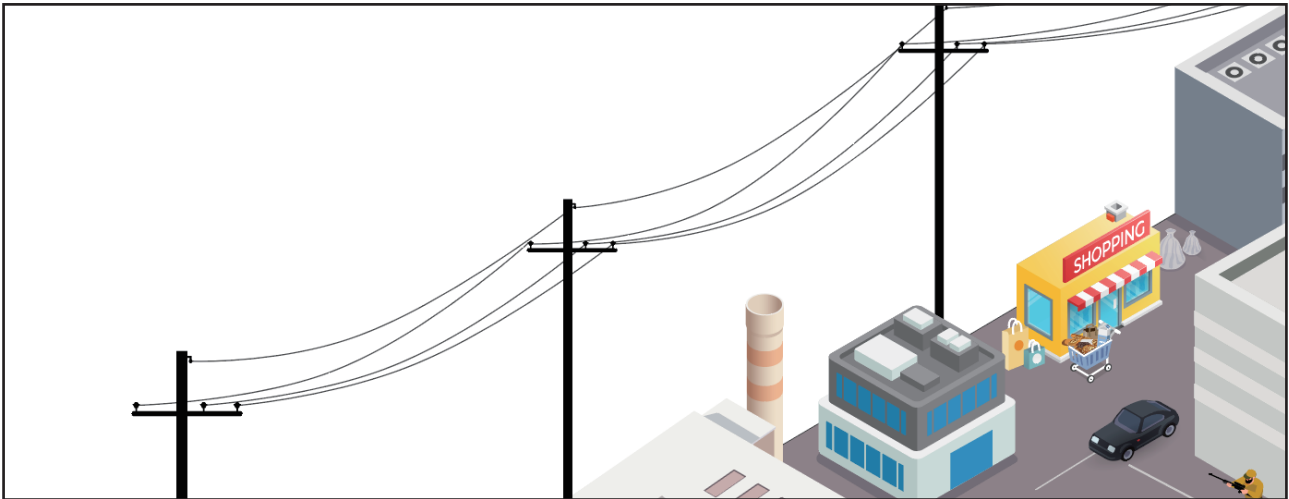


5/High-Tension Busbar

These appear along the road and especially dense near the landfill. Koko may crash into it when Koko is flying in the sky. The player can move up and down to avoid the high-tension busbar. If Koko is hit by it, he will lose 80 points of the health value and fall to the ground.

6/Electrical Pole

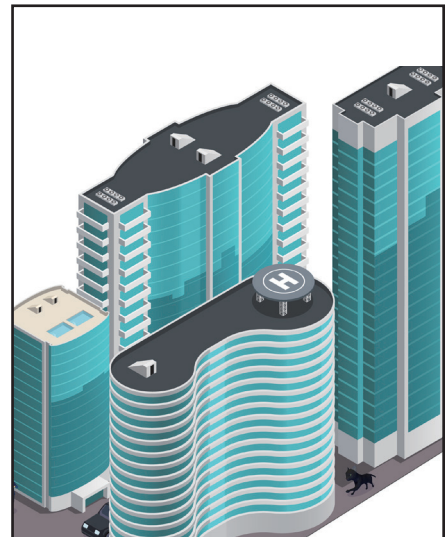
These poles appear along the road and especially dense near the landfill. Koko may crash into it when Koko is flying in the sky. The player can move left and right to avoid the poles. If Koko is hit by it, he will lose 60 points of the health value and fall to the ground.



□ Final Challenge

1/Contaminated Area

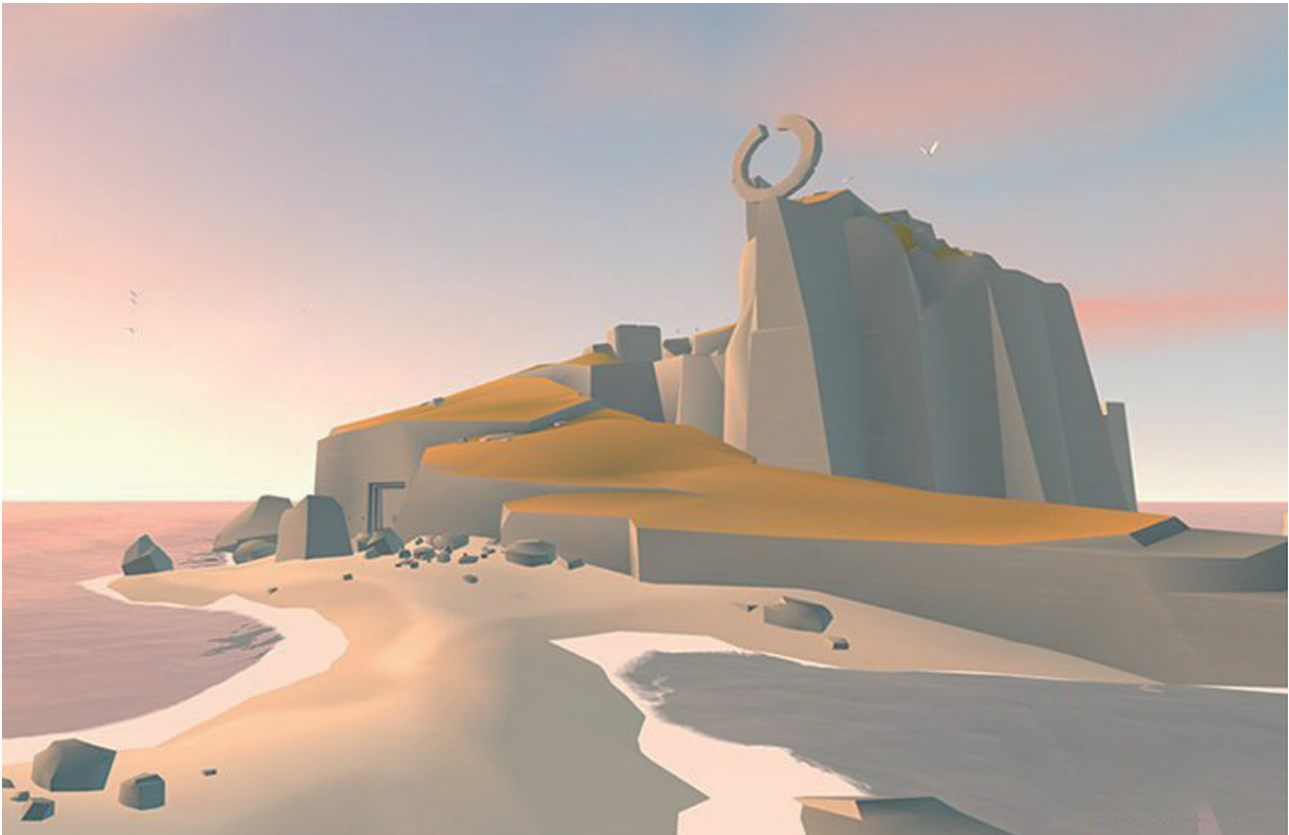
The contaminated area appears at the end of the game as shown in the illustration. In this area, the sky is full of light pollution (rays emitted by skyscrapers) and the ground is full of noise pollution. The player should move freely to avoid hitting the rays. If hit by the rays, Koko will lose 20 points of health value and fall to the ground. Therefore, the player must take off again. On the ground, the noise appears randomly. If Koko hears the noise, it will get dizzy and retrogress 5 meters. The area is 30 meters long. The player needs to cross this area and reach the destination of this level.



Level 4: Beach (The Happy Ending)

At this level, the player will not do too many interactions with other entities in the game. Instead, an animation is showed, telling players what the ending is. Koko will find his family members and the player will review all the knowledge he or she has learned during the journey by going through a list of ever choice he or she made during the trip.

☐ Player Perspective



3. GAME WORLD BEHAVIOUR

☐ Koko's motion

Koko's moving is realized by rockers of the two hand stank. Detailed explanations are as follows:

Walking Forward/Backward/Right/Left: Pushing both rockers up/down/right/left

Running Forward/Backward/Right/Left: Pushing both rockers up/down/right/left and maintaining for 2 seconds

Flying: -- Shaking both hands stank **once** (Koko will be lifted and then fall to the ground)
-- Shaking both hands stank **twice** (Koko will be lifted higher than the first condition and then fall to the ground)
-- Shaking both hands stank **triple times** (Koko will successfully fly and keeps flying)

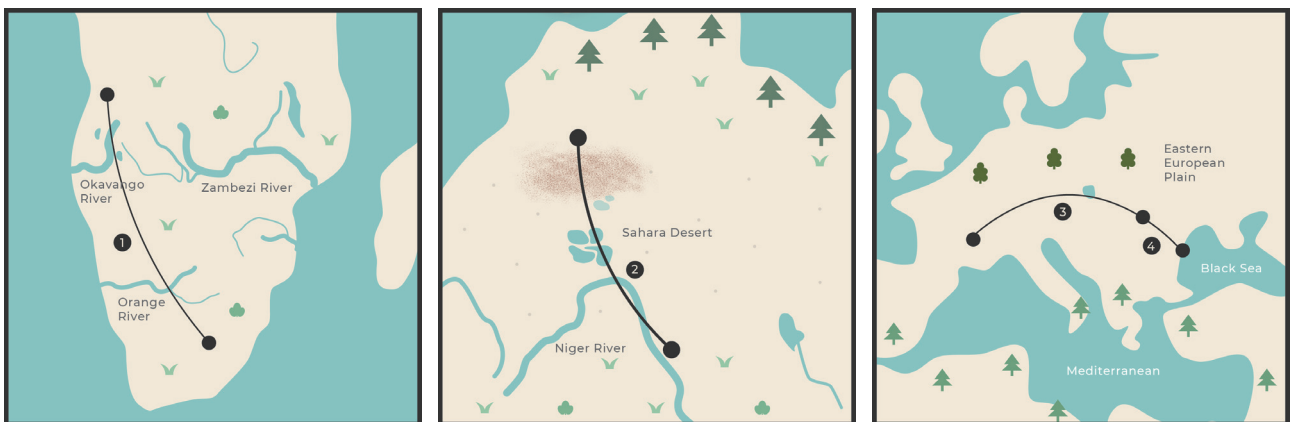
Note: When Koko is flying, the up and down of rocker switches to control up and down instead of forward and backward. The Koko can only move forward when flying.

□ UI

Selecting UI elements is controlled by buttons of the two hand stank. Detailed explanations are as follows:

Picking Up/Selection: When the player is near the item, the item will display a select frame. Under such circumstance, if the player presses the button of the right hand stank, the item can be selected. If the button is successively pressed twice, the item can be picked up.

Exit/Menu: If the player presses the button of the left hand stank, the map will pop out. If the button is successively pressed twice, the game will be paused, and the menu will pop out.



Hints Inside the Game: When the player is near the item, the item will display a select frame. Under such circumstance, if the player presses the buttons of both two hand stank, a hint (information related to the item) will pop up.



4. GAME ELEMENTS

Models: Foods, Animals (foods, enemies, competitive species), Landforms, Objects
UI: Start Interface, Menus, Map, Hints (popup windows)

MG: Opening Animation, Ending Credits; Animation of Level 4; Choices List used in Level 4, Animation of Koko Moving to Next Place on the Map

Sound: Background Music, Sound Effects (eat, get attacked, win, lose, pass the level, sound of other animals, sound of the environment)

5. GAME PROGRESSION

There are four different levels in Koko on the road. The time players are expected to spend on each level is quite different from each other. It takes approximately 5 to 10 minutes to accomplish the first level. Because it is the beginning and contains a series of tutorials to let players get familiar with the operations and rules of the game, this level is not that challenging. Level 2 costs around 10 to 15 minutes to finish. The hardship escalates a little bit, with more complicated enemies' attacking conditions. Furthermore, players may get stuck with the last task of this level – sandstorm. The third level is designed to be the hardest level. As a result, the player will spend nearly 15 to 20 minutes here. They may have to try repeatedly for the park task and contaminated area task. Eventually, the level 4 intends to let the story wraps up in a happy manner, and it does not involve so many interactions. Therefore, the player may only spend 5 minutes at this level.

The visual style of the game is adorable and sophisticated, which enables the player to appreciate and enjoy their time in a dreamlike wonderland, where they can escape from trivialities of their mundane life and temporarily forget the stress. With delicate sound design and visual reality techniques, Koko on the Road can offer an immersive game experience for players, letting them fully enjoy the delight of flying across the beautiful continents and travelling around the world.

The background story of this game is also well-developed. It can be viewed as a road movie, in which the player not only learn geographical and biological knowledge but obtain the pleasure of exploring and fulfilling their curiosity. They can also grow spiritually during the game and have inner interactions with the protagonist – Koko. Consequently, they learn how to be independent and gain courage.

As the next level will be locked on the map and what it is look like will be a secret until the player accomplishes the previous one, players are motivated by their curiosity to keep playing the game. At each level, they will encounter brand new difficulties, including unacquainted enemies, strange foods, and tricky obstacles. Simultaneously, more choices and landforms are offered to them, which allows the player to always obtain a feeling of freshness.

6. SYSTEM MENUS AND OPTIONS

