Game from the Perspective of the Colourblind

A retro triptych of games that aim to raise awareness about colour blindness, each level is designed to represent one of the three types of colour blindness: deuteranopia, protanopia, and tritanopia.

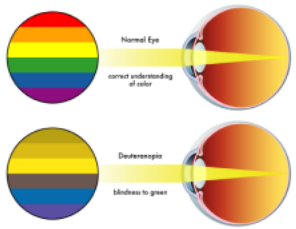
Tools:

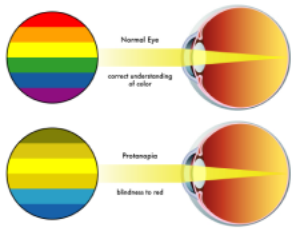
Co-created with
Diana Milena Galindo Clavijo

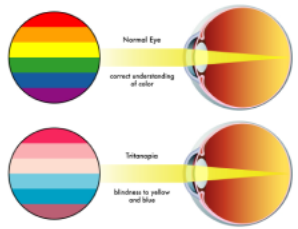
Keywords:
#Game Design #UI/UX Design #Gamified Learning
#Digital Inclusion #Interactive Storytelling
Website:
https://canacechen.com/conescious.html

Research

Deuteranopia	Protanopia	Tritanopia	
		Tritanopia	Tritanomaly
Refers to Red/Green colour blindness.	Refers to insensitivity to red light, leading to confusion of greens, reds, and yellows.	Refers to Blue/Yellow colour blindness.	
Congenital condition, present from birth. Defective or missing medium-wavelength cones (M-cones).	Hereditary condition caused by defective or missing long-wavelength cones (L-cones).	Missing short-wavelength cones (S-cones).	Defective short-wavelength cones (S-cones).
Affects 1 in 12 men and 1 in 200 women according to the UK National Health Service.	Most common form of colour blindness.	Rare.	
Difficulty seeing different shades of red, green and yellow.	Difficulty distinguishing reds and greens.	Struggles with distinguishing between colours containing blue or yellow, such as green and blue or and purple and red.	Difficulty differentiating green/blue and red/yellow hues.







Peak Sensitivity:
564 - 580 nm

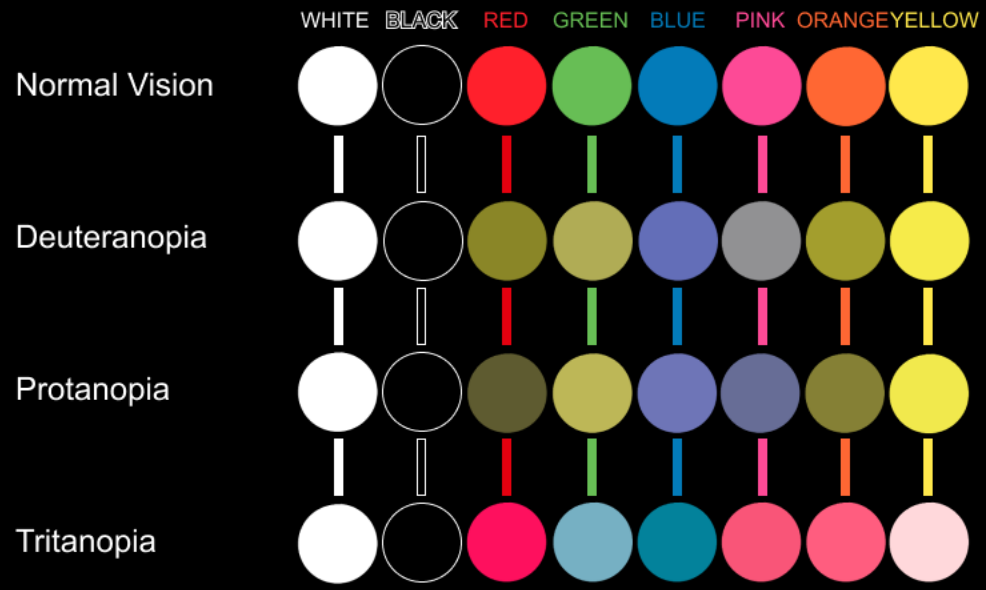
OPN1LW
L-cone

Peak Sensitivity:
534 - 545 nm

OPN1MW
M-cone

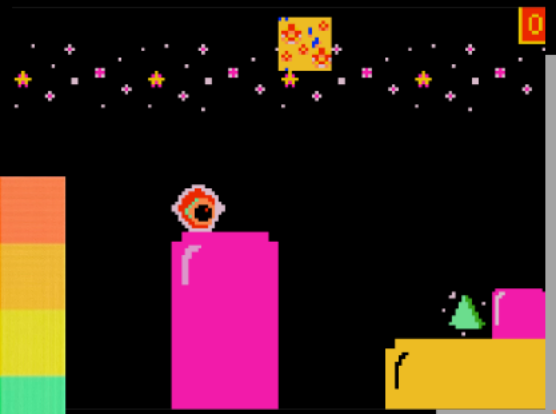
Peak Sensitivity:
420 - 440 nm

OPN1SW
S-cone

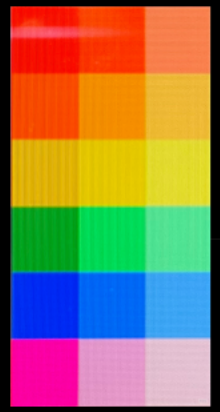


Game Concept & Design

The game raises awareness about colour blindness by immersing players in its three main types: Deuteranopia, Protanopia, and Tritanopia. Starting in black and white, players navigate colour-shifted levels, collect missing cone cells, and restore full colour vision. Completing all levels reveals the true colour spectrum.

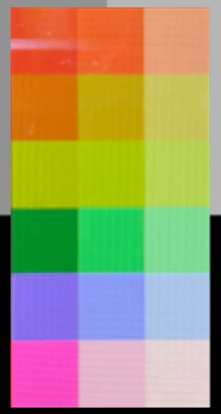


Home page designed and developed by Diana Milena Galindo Clavijo.



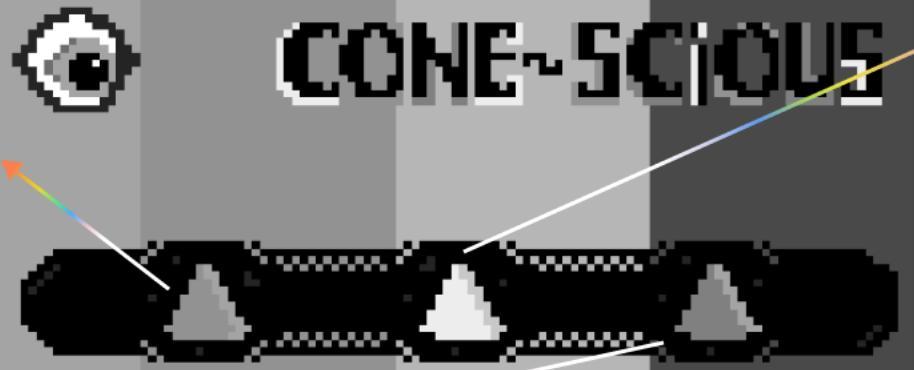
Game 1: Deuteranopia
Navigate platforms and collect the missing green genes while avoiding falling to progress.

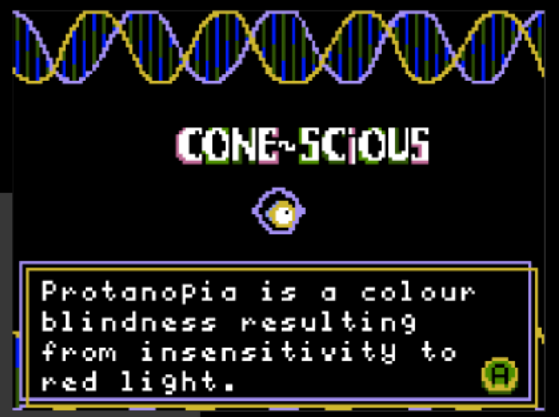
(Designed and developed by Diana Milena Galindo Clavijo)

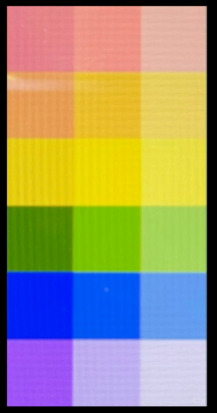


Game 3: Tritanopia
Traverse a maze, collecting the missing blue genes while steering clear of incorrect genes to find the exit.

Game 2: Protanopia
Gather the missing red genes while avoiding other distracting or incorrect genes.







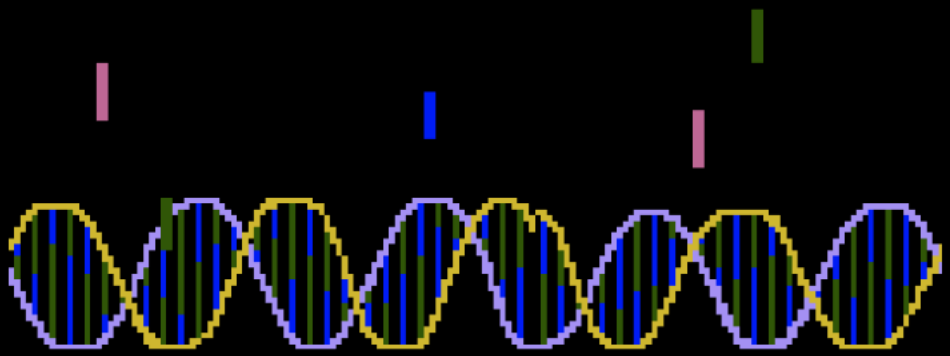
Creating Colour Palette for Each Game

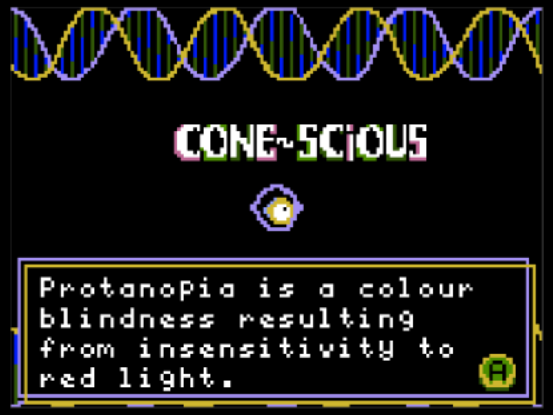
```
namespace color {
    //% fixedInstance whenUsed block="Deuteranopia"
    export const Deuteranopia = bufferToPalette(hex`
        dcbacb
        f72107
        f84f00
        ebc204
        00a426
        0022ec
        ff8552
        f2bd3b
        eee437
        4fde8f
        e396ca
        fe01aa
        dcbacb
        dcbacb
        dcbacb
        000000
    `);

    //% fixedInstance whenUsed block="Protanopia"
    export const Protanopia = bufferToPalette(hex`
        000000
        000000
        c56595
        ddb45a
        cd966f
        e0db4c
        d2b83f
```

Game 2: Protanopia

2. Gameplay
The player controls the eyeball, navigating the DNA chains to collect red genes while avoiding incorrect ones.

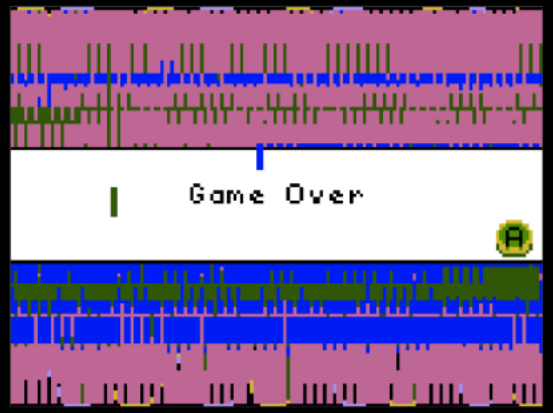
1. Intro
The start screen introduces Protanopia, and explains to the player about the gameplay.



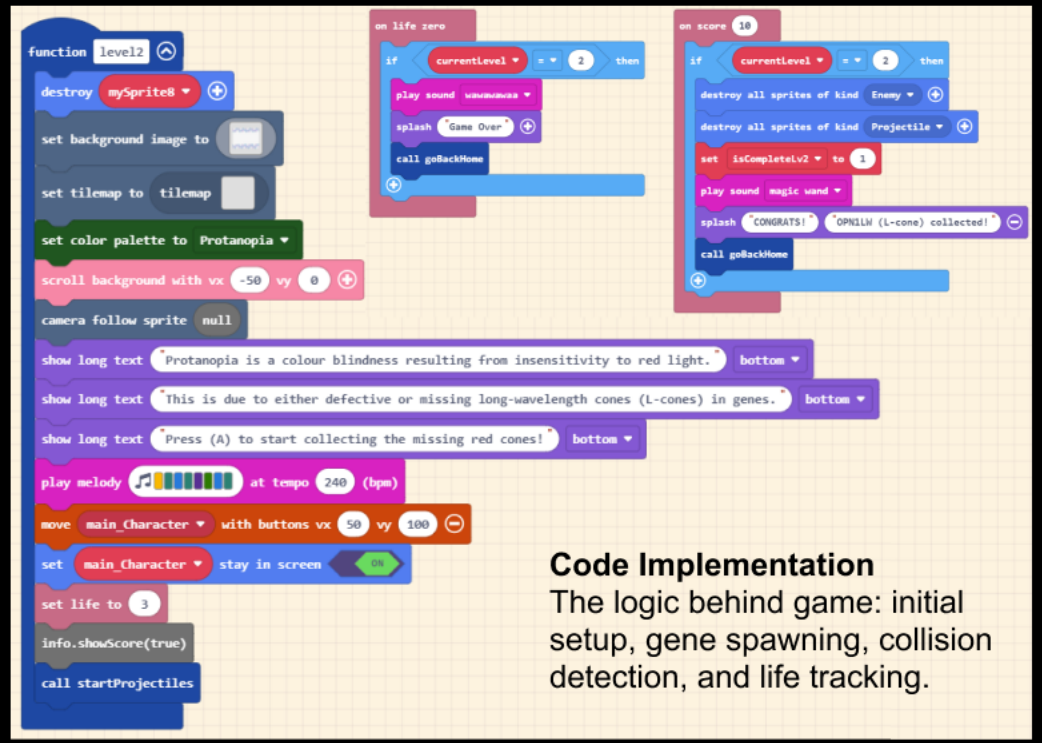


Concept and Gameplay
The second level, inspired by Space Invaders, focuses on Protanopia, or red-green colour blindness. The game design features a background of two DNA chains missing red genes, visually representing the condition. Players control an eyeball avatar to collect red genes while avoiding other genes, with three lives available. Losing all lives ends the game, while collecting 10 red genes restores the missing L-cone and related vision.

3. Lose
The player loses all lives.



4. Win
The player successfully restored L-cone and the colour vision for Protanopia.



Code Implementation
The logic behind game: initial setup, gene spawning, collision detection, and life tracking.

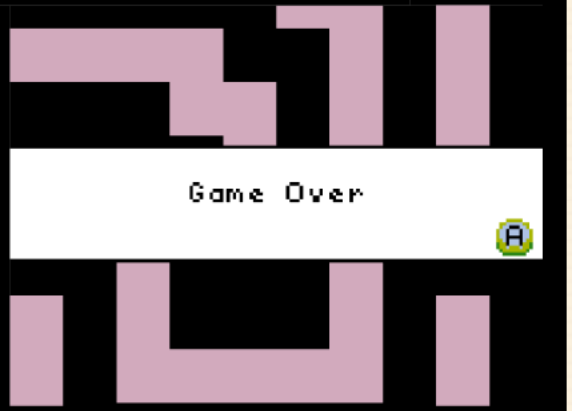
Game 3: Tritanopia

1. Intro
The start screen introduces Protanopia, and explains to the player about the gameplay.

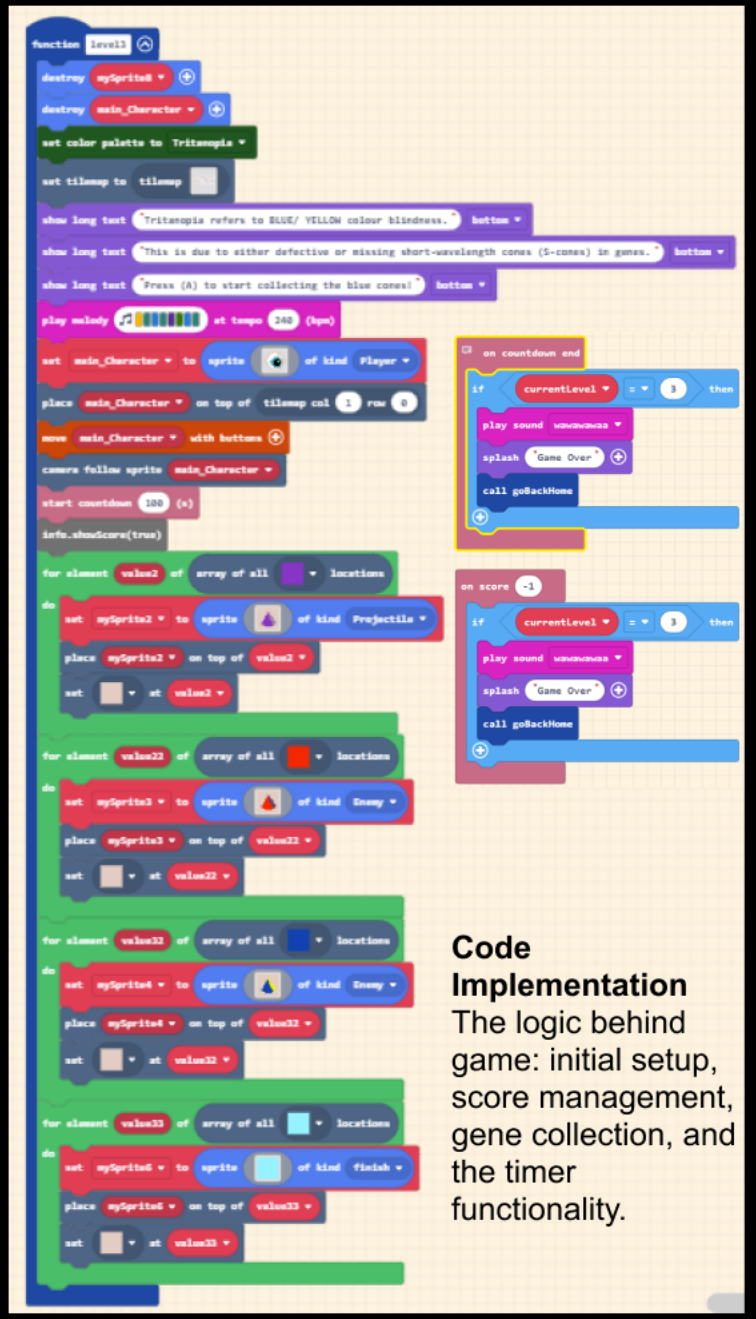
Concept and Gameplay
The third level centres on Tritanopia through a maze-style gameplay. Players are tasked with collecting the missing blue genes while finding their way out of the maze. Each correct gene adds one score, while wrong genes deduct one score. The player has 100 seconds to complete the maze; failure to escape or falling below zero score results in losing. Successful completion restores the S-cone and related vision.

2. Gameplay
The player navigates a maze, collecting blue genes and avoiding incorrect genes while racing against the clock.

4. Win
The player successfully restored S-cone and the colour vision for Tritanopia.



3. Lose
The score drops below zero or time runs out.



Code Implementation
The logic behind game: initial setup, score management, gene collection, and the timer functionality.

Result Showcase