Lecture 16: How can computation create educational games?

Today’s Challenge

How to create educational games?
• Useful concepts for Project 1 (but not exact)

How to decompose high-level idea and specification into scripts?
• Many different ways to implement same idea

How to develop simple, elegant code?
• Which Sprites are responsible for which tasks?
• Which scripts can be shared across similar Sprites?
• Where can private variables be used?

Project 1: Variables!

Points-based Game – Open ended
• Must contain integer variable and boolean variables
• Must have multiple levels of difficulty

Counting Game: Overview

What are the Sprites?

Directions: ten eleven twelve thirteen fourteen... fifteen

16 17 18 19 20

Your time: 0:00
Counting Game: Overview

Initial State?
- Numbers in random locations
- Timer at 0

Rat?
- Moves with arrow keys

Numbers?
- Must touch in order!
  - Number is said
  - Number becomes larger
- Ignores if not correct

Timer
- Counts up
- Stops at 20

Rat Scripts

Rat very simple!
- Moves in response to arrow keys
- Does nothing else!

(Set rotation to only face left-right)

Number Scripts

Scripts for Sprite Ten

What is Initial state?
- Go to random location
- Number 10 is first!

Number Scripts

Scripts for Sprite Ten

How to know it is our turn?
- Previous number is done

How to detect touched by rat?
- Wait until touching...

After 10 is touched, 11 is next...
Number Scripts

Scripts for Sprite Ten

- When clicked
  - Set costume to 1
  - Move to right
  - Play sound
  - Change size

Scripts for Sprite Eleven

- When I receive msg
  - Wait until touching rat
  - Play sound
  - Increase size
  - Signal next number in sequence

Goal: Simple code, similar across all

- Receive msg when next in sequence
- Wait until touching rat
- Play sound and increase size
- Signal next number in sequence

Timer Scripts

Timer continuously shows elapsed time

How to know game over?
- Receive signal from Twenty
- How to stop loop?
- Stop all scripts

Identify Game: Overview

What are the Sprites?

- 1-5 objects
- Random number displayed
- Random locations
- Random costumes
- Numbers at bottom
- Correct (matching): Says number
- Wrong: Hide and try again
- Increment guesses

Repeat with new objects
- Increment questions
Stage Scripts

Stage controls overall action
- Descriptive names for messages
- Can tell who is sending/receiving

Stage sets Global Variables
- Stage picks "How many" objects should be shown
- Stage picks "Costume" the objects should switch to
- Stage tells Numbers and Objects when ready
- Stage tracks counts of Guesses and Questions

Objects Scripts

Each Object has many different costumes...

Objects Scripts

Each has private variable
- My_id
- Remaining code identical across Objects

When receive Stage:Show Objects:Many?
- Determine for itself if it shows
- Shows if "How many >= my_id"
- Use global variable Costume so all change to same costume

Global Shared vs Local Private Variables

For all sprites: (Global, shared)
- All sprites see same variable
- When one sprite changes value, all sprites see new value
- Use when want to communicate info between Sprites
- Naming: FirstLetterCapitalized

For this sprite only: (Local, private)
- Only this sprite sees variable
- Multiple sprites can have own variables with same name
  - Each contains different values
- Use with similar Sprites; same code, unique data/behavior
- Naming: lower_case_letters
Numbers Scripts

Each Number has private variable: my_id

When receive message?
- Each determine if they are right answer
- Waits until clicked
- If my_id is right answer, tell Stage done
- Otherwise, tell Stage to try again

Tip: Draw a box around number and letter Sprites so they are easier to click!

Today’s Summary

Today’s Topics
- Try to write simplest code possible (might not be your first attempt, so be willing to restructure)
- When developing similar Sprites, perfect a small number
  - Copy to make other identical Sprites
- Use Global Variables to pass information between Sprites
  - All Sprites see same value
  - Example: How Many? And Costume in Identify Game
- Use local variables when each Sprite should have own value
  - Helps make later code identical across similar Sprites
  - Example: my_id variable in Identify Game

Exam 1 : Friday 10/15
Programming Project: Friday 10/22 Upload Draft
- Wed 10/27 Due with Demo
- No homework for two weeks...