Announcements

- Read Chapter 7, Sec 1 for next time – Reading Quiz
- Don’t use copy to copy an object!
  - We will learn why later
  - Instead, import the object twice from the class folder
- Lecture on Chap 6, Tips and Techniques
  - Random numbers and random motion
  - We will also learn about variables
- Bug in Alice 2.0 – Random numbers don’t always work correctly, use Alice 2.2 for any program with Random numbers!

Random Numbers

- Random numbers are used in certain kinds of computer programs
- Examples
  - Security for web applications
  - Encryption for satellite transmissions
  - Gaming programs
- We will look at examples of using random numbers in animations

Built-in functions

- Alice provides built-in functions for generating random numbers
Example

- Move chicken forward a random amount
- The random number function returns a fractional value between 0 and 1

Demo: A range of values

- Can specify a different range of values by specifying a minimum and maximum value
- In this example, the random number will be a fractional value between 1 and 5

Demo: Integers (whole numbers)

- To generate a random integer value
  - Select integerOnly from the more option and make it true
  - Random value selected from 1, 2, 3, or 4 - not 5!

Random Hopping

- Rabbit hops (moves up) a random amount
- Rabbit comes back down to the ground, the same random amount
- What happens? How do we fix it?
Local Variable - in a method
• A *local* variable in a method
  – Stores a value
  – Has an initial value
  – Its value can be changed (set)
  – Its value can be used *only in this method*
  – Like a special property, but only for this method
• To create a local variable in a method
  – Click on create variable
  – Give an initial value
• To use a variable’s value
  – Drag the variable into place

Example – create a local variable
• distance – will store distance bunny is to move up

Setting a Variable’s value
• Drag variable down and select value

Use Variable’s value - Demo
• Drag and drop distance into places where you want to use its value
**Set Variable to Random Value - Demo**

- Distance is set a random value
- Same value is then used to move up and down

**Class Variables**

- Use “create new variable” under properties to create a class variable for an object
- This “class variable” will maintain the value throughout the running of the world unless you reset it

**Random Motion**

- In some animations, we want an object to move to a random location. We call this **random motion**.
- For example, a goldfish swimming in a random motion.

**Six Possible Directions**

- Six move directions are possible
  - Forward, backward, left, right, up, down
- We will eliminate backward, fish do not swim backward
- To simplify code, take advantage of negative numbers
  - This instruction moves the goldfish right
Storyboard

• Only three move instructions needed
  – Up (move down if negative)
  – Left (move right if negative)
  – Forward (no backward motion)

• Two parameters (min, max) to restrict motion of fish to nearby location
  
  fish.randomMotion
  Parameters: min, max
  Do together
  fish move up (or down) random distance
  fish move left (or right) random distance
  fish move forward random amount

randomMotion

• Minimum distance for move forward is 0

Demo

• To call randomMotion method, specify min and max values
  
  goldfish.randomMotion min = -0.2  max = 0.2

Demo

• Repeating the random fish motion over and over again… (more on this next chapter)
  
  • Change world.my first method
Classwork today

- Event handlers
- Random values
- Variables

- NO LOOPS