CompSci 94
Making Decisions
September 25, 2018

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Class Today

- Asking questions and making decisions
- Using functions
- If statements

- Assignment 3 due today
Review 1

- We have five objects in the world: clownFish, BlueTang, PajamaFish, Tortoise, Caiman.
- We write the dance procedure as a Swimmer procedure.

They all have tails. Who can call the Dance method?
Review 1 answer

• Only those of type **swimmer** can call the **dance** proc: BlueTang, ClownFish and PajamaFish

• **myFirstMethod:**

• The other two are **quadrupeds** so they don’t have access to the **dance** procedure
Review 2

• Suppose we want to modify the dance procedure so that the object waves its tail not once but three times? How would we do that?
Review 2 Answer

• Add in a count loop with a value of 3
Review 3

• Suppose we want each object to choose how many times to wave the tail? What type of parameter do we add?
Review 3

• Suppose we want each object to choose how many times to wave the tail? What type of parameter do we add?

• WholeNumber
Review 4

- In Dance, suppose we want the fish to turn to face any of the other 4 objects in the world and that object turn to face the fish.
- What type of parameter do we need to add?
Review 4 answer

• In Dance, suppose we want the fish to turn to face any of the other 4 objects in the world and that object turn to face the fish.
• What type of parameter do we need to add?
Thinking - More Advanced Worlds

• How do you build animations like simulations and video games?
• Need to write code that involves decisions
• Example car-race simulation
  – If the car stays on the road the score increases
  – If the car goes off the road into the stands, the car crashes
  – If the driver gets the car over the finish line, the time is posted and the driver wins!
Logical Expressions

- Decision is made based on current conditions.
- Condition is checked in a logical expression that evaluates to true or false (Boolean) value.
  - car on road  true
  - car over finish line  false
Format of an if

If (condition is true?)
   Action 1 if condition is true
Else
   Action 2 if condition is false

• You will do one of the actions, but not both
• Which action is determined by the condition
If/Else as a picture

- In Alice, a logical expression is used as the condition in an If/Else control structure
- If condition is true do one thing, or if it is false, do something else
Is the Pig to the Panda’s right?

• If pig is to the Panda’s right, we want Pig to move to the other side of Panda
• If pig is to Panda’s left, we want pig to say she is to Panda’s left
How do we make a decision?

- Use an **if statement**
- The “if statement” is a tile at the bottom. Drag it in and select “True”
- Now we need a condition that evaluates to true or false
Alice has built-in functions!

- Functions calculate a value, may help you answer a question.
- What is the pig’s width?
  - `getWidth` results in a number
- Is the pig to the Panda’s right?
  - `isToTheRightOf` results in a true or false value
Example: is the pig to panda’s right?

- Drag in `isToTheRightOf` from **functions** into the word **true**
- Then add in an action for **true** and one for **false**
Scenarios for when the code executes

- What happens in this case?
  
- What happens in this case?
Scenarios for when the code executes

• What happens in this case?
  – *Pig says she is to Panda’s left*

• What happens in this case?
  – *Pig moves to the other side of Panda*
If Panda is greater than 5 units from birch tree, then move closer to it

- Click on true part of if
- Lots of true/false conditions you can select
Relational operators allow a comparison of two items

- $>$, $<$, $\geq$, $\leq$, $==$，$!=$
- If pig’s height $> 3$
- If pig’s width $==$ 4 (means “equal to”)
- If pig’s depth $!=$ 5 (means “not equal to”)

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If Panda is greater than 4 units from birch tree, then move closer to it

If panda’s distance to birchTree > 4
    Move Panda 3 units closer to the birchTree
Else
    Do nothing

• You can leave the else part blank if you don’t have anything to do if it is false
How to create this if?

• Drag the “if” in
• Click on “true” and select “relational operators”, then the >,
• Then 2 numbers
How to create this if?

• Drag in function `getDistanceTo` over the first number
• Also change second number to 4.0
Result - If with only one action

• It is ok to not have an action for the else
Nested If

- What does this code do?

```plaintext
if this.panda.getDistanceTo(this.birchTree) >= 4.0
    if this.panda.isFacing(this.birchTree)
        this.panda.say("what a lovely tree")
        add detail
    else
        this.panda.turnToFace(this.birchTree)
        add detail
    this.panda.move(FORWARD, 3.0)
        add detail
else
    this.panda.say("I like trees")
        add detail
```
What that code does:

• If the pig distance to tree is greater than 4.0 AND the pig is facing the tree, then the pig says “what a lovely tree”

• If the pig distance to tree is greater than 4 AND the pig is NOT facing the tree, the pig turns to face the tree and moves closer to it

• If the pig distance to the tree is less than or equal to 4, the pig says “I like trees”
How does the pig say how tall she is?

• First have the pig say “I’m this tall”
• Then click on the saying to add a number also

• And you get two things to say:
But wait, that is not the pig’s height? How do we get that height?
Get the pig’s correct height

• Use a built-in function, drag in “getHeight” over the number 2.0

• Run
Adding Math

• Suppose the pig wants to cheat and say it's is 1 unit taller than it really is.

• Click on the down arrow to add more to the number with math
Here is how to add math

• Click on down arrow by number to add to
Pig vs Cheating Pig

I'm this tall 1.1726043852633745

I'm this tall 2.1726043852633747
Properties

- A 3D object has its own:
  - *Procedures* – things it can do, like move, turn
  - *Functions* – values it can calculate like distance to, getHeight
  - *Properties* – data on its current state
    - Paint – what color it is
    - Opacity – value of see-through
    - Width, height and depth
    - Vehicle
Change Properties

• What happens when this code executes?
 Change Properties

- What happens when this code executes?
This lecture covered

• Built-in functions

• Making decisions with an if statement

• Dragging in functions from the function tab for true or false conditions for an if statement

• Combining a string with a number value to create a new string, that could be shown as a string

• Use Math to change a number