Repetition: Counted Loops

Alice
Overview

- Repetition
- Counted loop
- Example
- Nested loops
- Example
Repetition

In many kinds of animations, especially simulations and games, some actions happen again and again.

Example: Gallery games where targets appear randomly on screen and are caught or shot down, only to appear elsewhere in the scene.

Of course, actions are made to happen again and again by running an animation instruction (or a method) more than once.

We call this repetition.
Example

An astronaut has landed on the moon. We want to write an animation of the astronaut performing the famous “moonwalk.”

The astronaut will need to turn right and then moonwalk backward several steps.
Storyboard

Moonwalk:
repeat 3 times
slide back on left foot
slide back on right foot

slideBackLeft:
Do together
move backward
turn left arm, right leg and
and left leg and foot
Do together
move backward
turn left leg as if sliding
Do together
move backward
return arm and legs to
original positions

slideBackRight:
Do together
move backward
turn right arm, left leg and
and right leg and foot
Do together
move backward
turn right leg as if sliding
Do together
move backward
return arm and legs to
original positions
<table>
<thead>
<tr>
<th>Do together</th>
</tr>
</thead>
<tbody>
<tr>
<td>astronaut move backward 0.15 meters style = abruptly more...</td>
</tr>
<tr>
<td>astronaut.LeftUpperArm.LeftLowerArm turn backward 0.1 revolutions style = abruptly more...</td>
</tr>
<tr>
<td>astronaut.RightUpperLeg.RightLowerLeg turn forward 0.05 revolutions style = abruptly more...</td>
</tr>
<tr>
<td>astronaut.LeftUpperLeg.LeftLowerLeg turn backward 0.05 revolutions style = abruptly more...</td>
</tr>
<tr>
<td>astronaut.LeftUpperLeg.LeftLowerLeg.LeftFoot turn forward 0.05 revolutions style = abruptly more...</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Do together</th>
</tr>
</thead>
<tbody>
<tr>
<td>astronaut move backward 0.15 meters duration = 0.5 seconds style = abruptly more...</td>
</tr>
<tr>
<td>astronaut.LeftUpperLeg turn forward 0.025 revolutions style = abruptly more...</td>
</tr>
<tr>
<td>astronaut.LeftUpperLeg.LeftLowerLeg turn forward 0.15 revolutions duration = 1 second style = abruptly more...</td>
</tr>
<tr>
<td>astronaut.LeftUpperLeg.LeftLowerLeg.LeftFoot turn backward 0.05 revolutions duration = 1 second style = abruptly more...</td>
</tr>
</tbody>
</table>
moonwalk

World.my first method  astronaut.moonwalk

astronaut.moonwalk  No parameters

No variables

astronaut.slideBackLeft
astronaut.slideBackRight
Repetition: invoke method again and again

What is the problem with this solution?
Counted Loop

A counted loop is an alternative way to write repetitive code.

- Repeats instructions a counted number of times.
- In Alice, 

```plaintext
World.my first method  No parameters

No variables

Do Nothing
```

[Diagram of a counted loop in Alice environment]
Repetition: Counted Loop

The loop instruction
- saves programmer time
- is convenient
Demo
If “Infinity times” is selected for a loop, this means the loop will run until the program is shut down.
Example

To make the carousel go round continuously in an amusement park world:

For code, see *carouselAnimation* in Figures 7-1-17 & 18.
More complicated loops

It is also possible to place a loop statement within another loop statement.

This is called “nested loops”
An example of nesting loops

In this amusement park ride, we wish to create a ride with maximum nausea potential.

The whole Ferris wheel will rotate clockwise, while the two inner wheels will rotate counterclockwise. The inner wheels should perform 2 revolutions for each outer loop revolution.
Rotating each of the wheels

- Rotating the outer wheel 10 times
- Rotating the inner wheels 2 times
The entire code

The two loops structures, inner wheel loop nested within the outer wheel loop.

How many times does the inner loop execute?
Assignment

Read Chapter 7, section 1
- Counted loops
- Nested loops