Repetition

• We first illustrate simple looping using “loop,” when you know how many times you want to repeat a section of code.
• Then we examine looping based on a condition. The loop continues repeating as long as a condition is true, and stops when the condition is no longer true.
• We also write some methods.
Add in objects

- Drop a dummy camera to save the original camera view (always a good idea!).
- Add a bunny from the animals folder.
- Add three broccoli from the *Kitchen* folder and inside there the *food* folder.

The world should look like this:

The broccoli spears will be floating in the air. Right click on their name in the object tree and select “methods”, “move to”, “ground”. That will get them on the ground. Then click on them and push them all back far behind the bunny. You can use the up/down button to move them up a little. Your world looks like:
Create new method: bunny.hop

• First let’s teach the bunny to hop, and then to hop over to the broccoli to eat it.

• Click on “bunny” in the object tree, then the “methods” tab, then “create new method”

Name the method: hop

• Name the method “hop”

• And you should see a bunny.hop tab now
Write the method “hop”

- Drag up “Do together” from the bottom of the pane and put a “Do in order” inside it.
- In the “Do in order” drag in a “bunny move up 0.5 meter”
- Select “more” and set the duration to .25 sec

Write the method “hop” (cont)

- Make a copy of the “move” command and change “up” to “down” in the second one.

- In the “Events” editor, under “when the world starts”, Change “my First Method” to “bunny”, then “hop”

Now play your world
Write the method “hop” (cont)

- The bunny moves up, but not forward.
- Add into the Do together - “bunny move forward .25”
- Then select “more”, “duration”, “0.5”

![Image of Do together interface]

- Play again, and the bunny hops and moves forward

Let’s get the bunny to hop in our story

- Click on the “my First Method” tab
- Click on bunny, methods and you should see the “hop” method

![Image of bunny’s details]

- Drag the “hop” method into my first method

![Image of world.my first method]

- In the Events, change “when the world starts” to “world.my first method”
Repeating the hop - loop

• Click “Play” and the bunny hops once.
• We’d like to get the bunny to hop 4 times.
• A “loop” allows you to repeat commands a specified number of times.
• Drag “loop” into “my First Method”, select “other” and type “4”

Bunny hop 4 times

• Drag the hop method inside the loop and click Play. The Bunny should hop 4 times.
• We could add more items to the loop. Drag in “bunny say” and type in “hop”, select “more” and pick “duration = 0.5 seconds”
• Now the bunny hops and says “hop” 4 times
Loop

• The number of times the bunny hops is exact.
• We can change the number to another number, say 3 by clicking on the 4 and changing it to 3

• Now the bunny hops and says “hop” exactly 3 times.

Next let’s teach the bunny to eat

• Now we will teach the bunny to eat one of the broccoli.
• We don’t know how far the broccoli is, so we will need the bunny to hop over to the broccoli repeatedly until the bunny is close to the broccoli.
Create new method “eat”

- Click on “bunny” in the object tree, then the “methods” tab, and then “create new method”
- Type in “eat” as the name
- You should see the bunny.eat tab

Create new method “eat” (cont)

- Drag in bunny method “turn to face” and select “broccoli”
- To test this out, in the Events area, change “when the world starts” to “bunny” “eat”
- Then “Play” to see the bunny turn toward the broccoli
Create new method “eat” (cont)

- To repeat code based on a condition, we will need a “while” loop
- Drag up the “while” and select “true”

How a while loop works

```plaintext
while <condition>
  <code>

• If the condition is true, the code is executed. If the condition is still true, the code is executed again. This repeats until the condition is false, then the code in the loop is no longer executed.
```
Create new method “eat” (cont)

• We want the bunny to keep hopping over to the broccoli as long as the distance between them is greater than 0.6
• Click on “world” then “functions” tab
• Drag a>b into the “true”, select 1, and 0.6

Create new method “eat” (cont)

• Click on “bunny”, “functions” tab
• Drag the “bunny distance to” over the 1 and select “broccoli”
Create new method “eat” (cont)

• Click on “bunny”, “methods” tab and drag the bunny “hop” method into the “Do Nothing”

• Play, and the bunny heads over to the broccoli, stopping when it is closer than 0.6 meters distance.

Create new method “eat” (cont)

• Now let’s add some commands to bend over and eat the broccoli.

• Add after the while loop, commands for the bunny to turn forward .2, the broccoli to disappear (set isShowing to false) and the bunny to turn backward.
bunny.eat

• Here is the code now for bunny.eat

```
bunny.eat No parameters
```

```
No variables

bunny turn to face broccoli more...
While (bunny distance to broccoli > 0.6)
bunny hop
bunny turn forward 0.2 revolutions more...
broccoli set isShowing to false more...
bunny turn backward 0.2 revolutions more...
```

• Click Play and watch the bunny eat the broccoli

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Eat all the broccoli

• We need to parameterize the broccoli so the bunny can eat other pieces of broccoli

• In bunny.eat, click on “create new parameter”, name it “tastyMorsel” and select “Object” for type
Parameter (cont)

• Drag “tastyMorsel” over all three occurrences of “broccoli”

Now finish story

• First, change “when the world starts” back to “my first method”

• Click on the “world.my first method” tab

• After the “loop” put in a “Do in order”

• From “bunny” “methods”, drag in “eat tastymorsel” three times, selecting broccoli, broccoli2, and broccoli3.
Final code for “my first method”

• Here is the final code. Play to watch the bunny eat all the broccoli.

More on “loop”

• Instead of “Loop 3 times”, click on the 3 and select “infinity times”
• Play the world, when will the bunny eat the broccoli?

• Never! Infinity is dangerous to use. The statements after it never happen.
• Change the “infinity times” back to “3”
If you know about lists ....

• If you have done the list tutorial, then look at the rest of this tutorial. Otherwise you are done.
• You could make a list of broccoli for the bunny to eat.
• Under “world” “properties”, click on “create new variable”
• Name it “food”, select type “object” and select “make a list”
• Add the three broccoli to the list

Food list

• Here is the food list

• And after clicking “ok” you should see:
Now use the list

• In “my first method” disable or delete the “Do in order”
• Drag up from the bottom the “For all in order” and select “expressions”, “world.food”
• Click on “bunny”, “methods” tab
• Drag over the bunny “eat tastyMorsel” into the “do nothing” and select “expressions”, “item_from_food”
• Play your world to watch the bunny eat the broccoli

Final Code with List

EXTRAS

• You could add more broccoli into the world and add them into the list to get eaten
• You could have the bunny move other parts when it hops, such as its feet or its head.