

Lists Tutorial



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Loading the World

- Open a new world, with any template
- Save it in a directory that you can find again,
- After you have opened the file go into the "Layout" mode by clicking on the green button **Add Objects** (toward the middle of screen)
- Click **more controls**. Click **drop a dummy at the camera**. Rename the dummy 'originalPosition.'
To leave the layout mode, click **done**

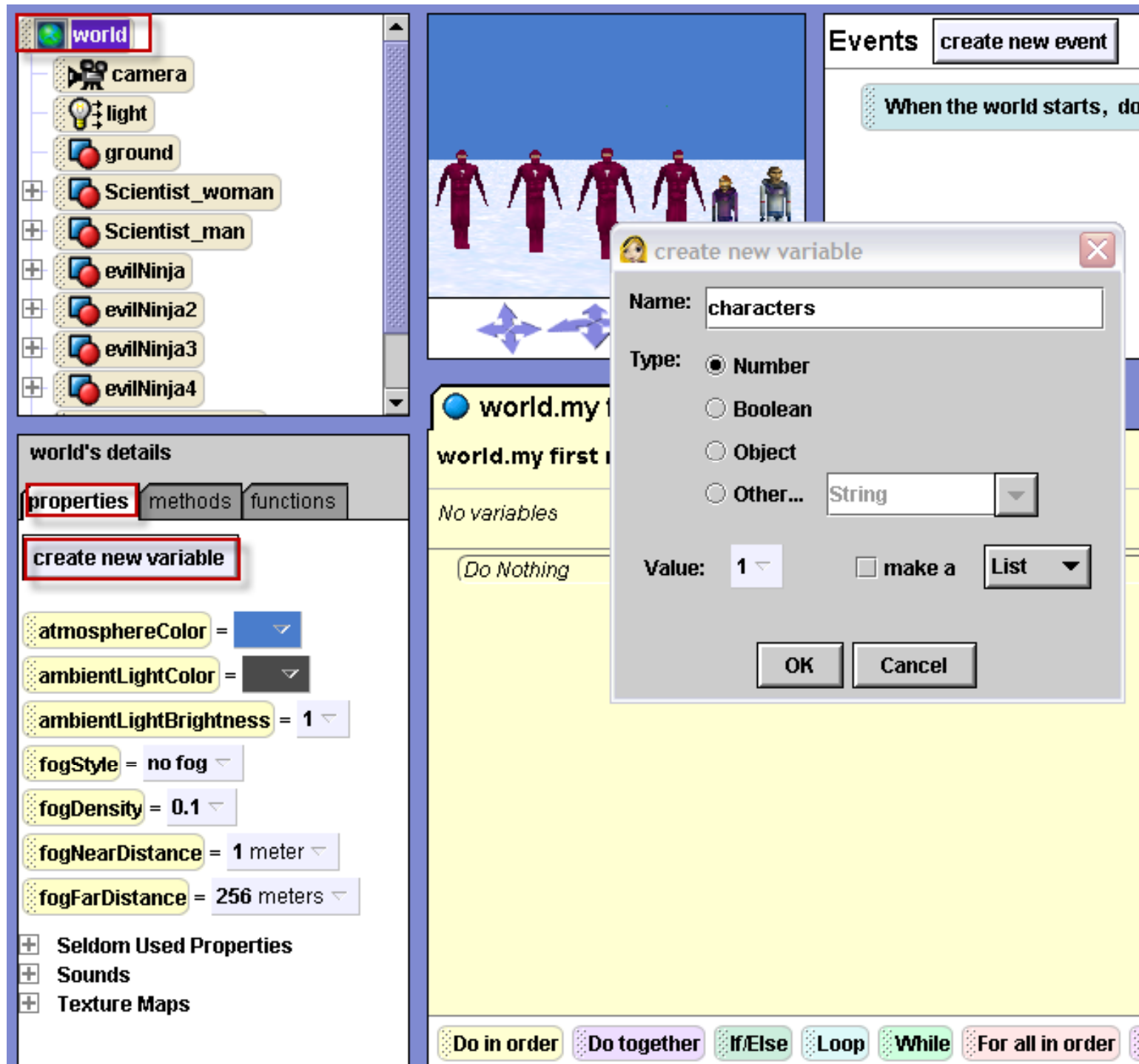
Adding the Objects

- Go to the gallery and add four **evilNinjas** to your world (from the People folder)
- Add two other people to your world
- I've added the **scientist-man** and **scientist-woman**



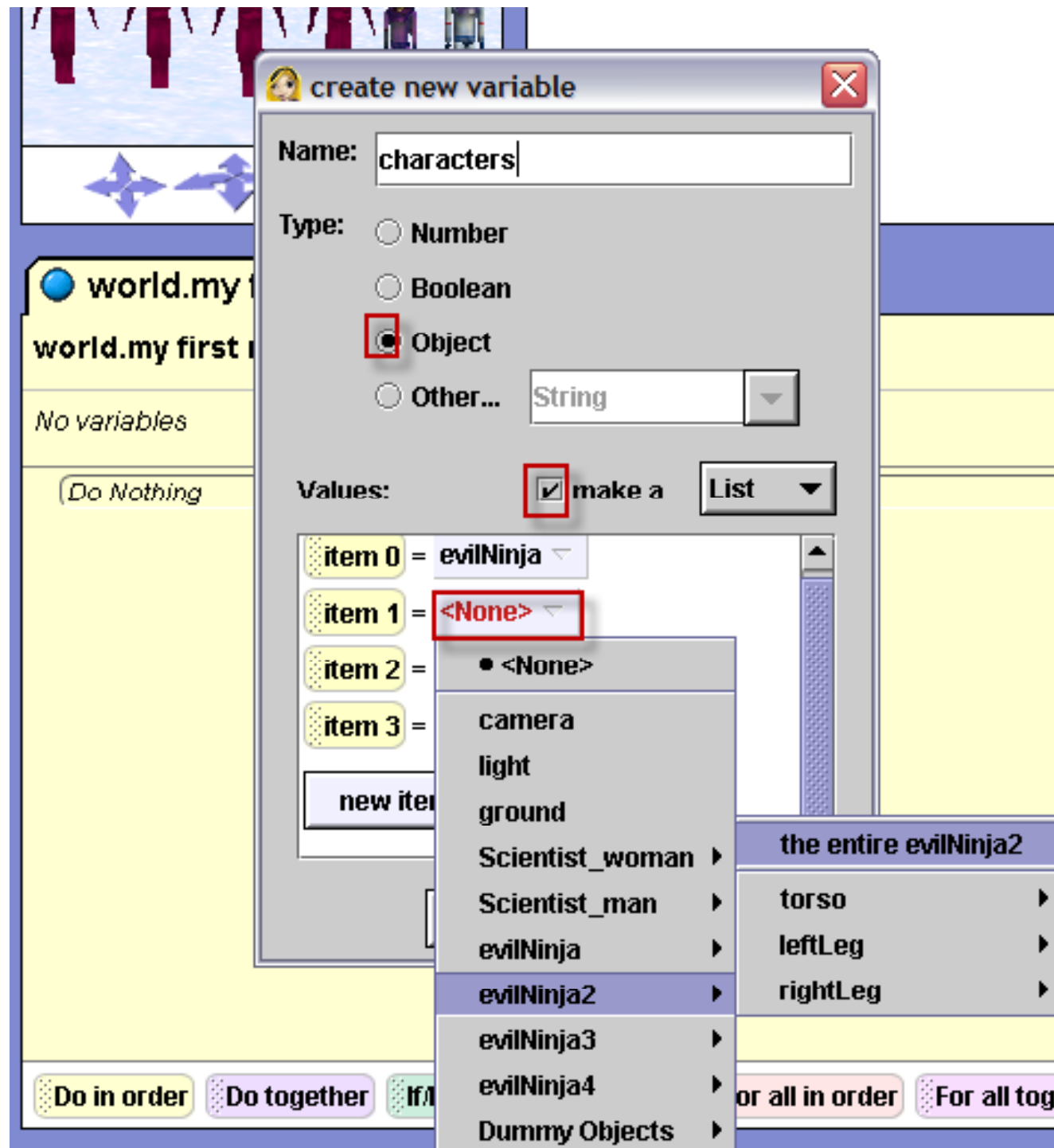
Part 1: Making a List

- We will use a list to make all four of the ninjas jump up and down together and then kick and spin one at a time
- Click on the world in the object tree and on the **properties** tab
- Click **create new variable**
- Name it 'characters'
- See the screenshot on the next slide for an illustration



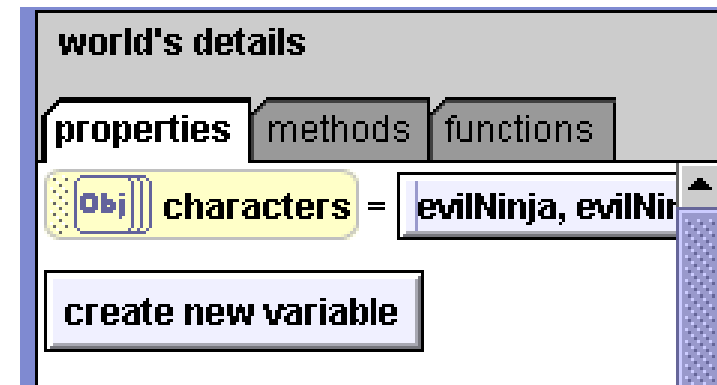
Making a list (cont 1)

- Select “object” as the type
- Check the box “make a List”
- Click the “new item” button four times
- For item0 select evilNinja
- For item1 select evilNinja2
- For item2 select evilNinja3
- For item3 select evilNinja4
- See the screenshot on the next slide for an illustration



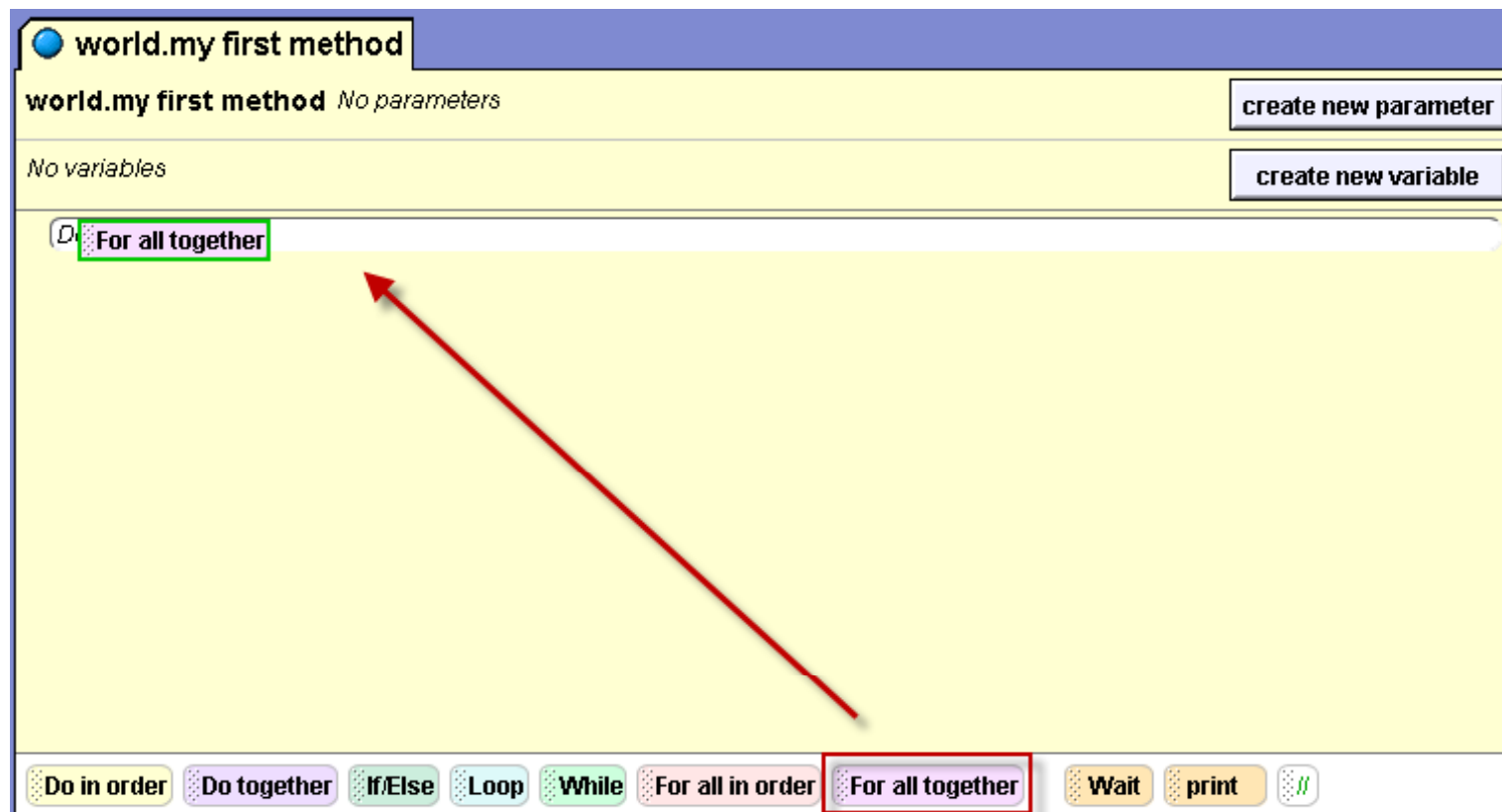
Making a List cont(2)

- Now, there is a
“characters” list variable
at the top of the world
“properties” tab



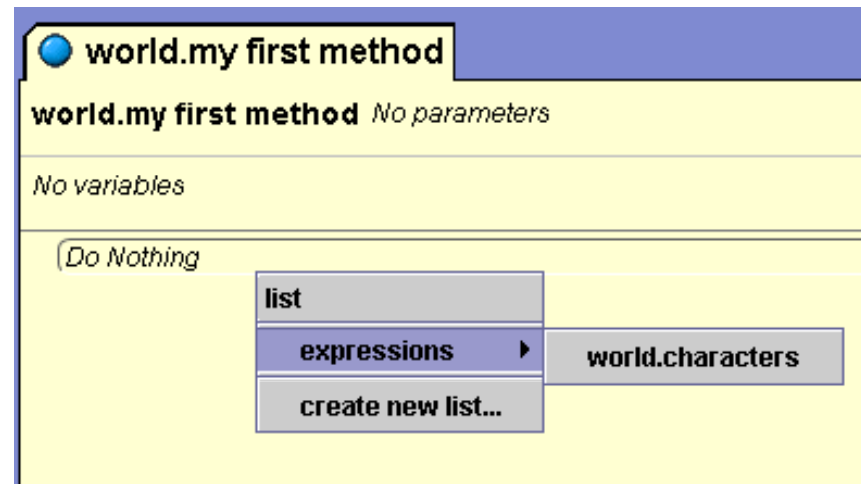
Part 2: Writing the method

- Drag “for all together” into “world.my first method”



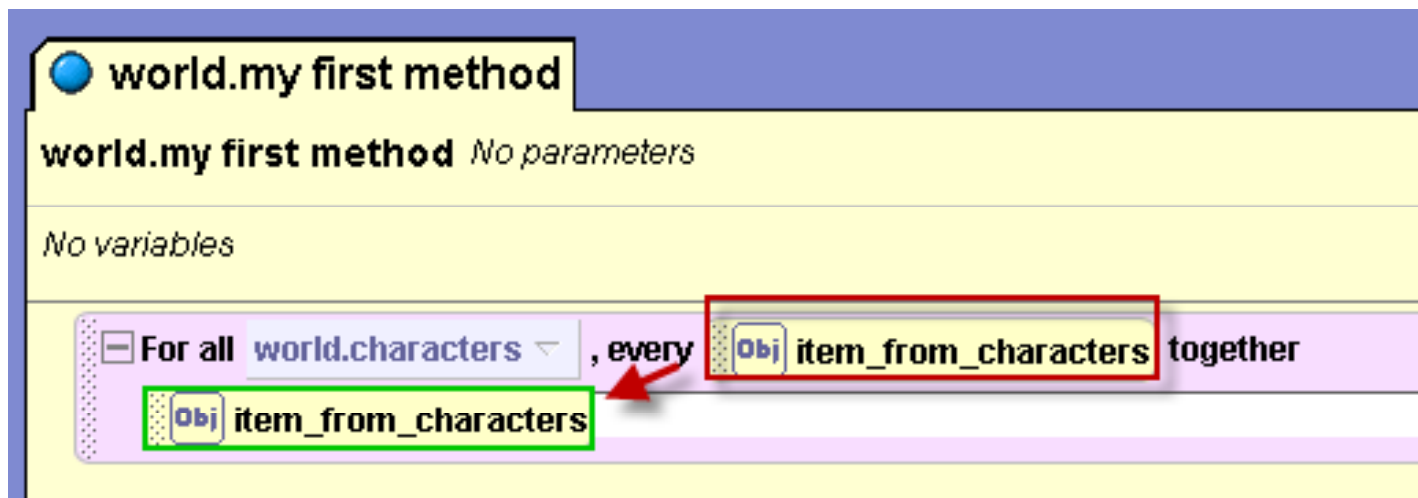
Writing the method (cont 1)

- In the drop down menu, select **“expressions”**, then select the list world.characters
- **“For all together”** means that all of the items in the list will perform the instructions at the same time.



Step 1: For all together

- Click on “item_from_characters”
- And drag it on top of the “Do nothing”



For all together (cont 1)

- In the drop down menu, select “turn to face” and then select “camera”
- Click on “more” to change the duration to 0.25
- Drag “item_from_characters” again and select the “move” up and “move” down instructions.
- Play your world. Your method should look like this:

The screenshot shows a Scratch 'for all' loop block. The loop is configured with the following settings:

- For all** `world.characters` **, every** `Obj` `item_from_characters` **together**
- Instruction 1:** `item_from_characters` **turn to face** `camera` **duration = 0.25 seconds** **more...**
- Instruction 2:** `item_from_characters` **move** `up` `1 meter` **duration = 0.25 seconds** **more...**
- Instruction 3:** `item_from_characters` **move** `down` `1 meter` **duration = 0.25 seconds** **more...**

Step 2: For all in order

- Now drag “for all in order” underneath the “for all together” and select “expressions”, then world.characters

The image shows the Scratch code editor interface. At the top, a blue bar contains a globe icon and the text "world.my first method". Below this, a yellow bar displays "world.my first method" and "No parameters", with a "create new parameter" button on the right. Another yellow bar below shows "No variables" and a "create new variable" button. The main workspace contains a purple "For all together" loop block. The loop's variable is set to "item_from_characters" (a blue block with a dot icon). Inside the loop, there are three orange blocks: "turn to face camera" with a duration of "0.25 seconds", "move up" with a distance of "1 meter" and duration of "0.25 seconds", and "move down" with a distance of "1 meter" and duration of "0.25 seconds". Below the loop, a green "For all in order" block is visible. A red arrow points from the "For all in order" block in the bottom toolbar to the "For all in order" block in the workspace. The bottom toolbar contains several control blocks: "Do in order", "Do together", "If/Else", "Loop", "While", "For all in order" (highlighted with a red border), "For all together", "Wait", "print", and a green flag icon.

For all in order (cont 1)

- For all in order means the ninjas will perform all of the instructions, one right after the other (in the order that they were added to the list)
- We want the ninjas to each turn their left leg and spin one at a time.
- However, “`item_from_characters`” does not have any parts
- We will have to use a class level built in function to turn only a part of the object.

For all in order (cont 2)

- First, drag “item_from_characters” into the “for all in order” and select “turn backward”
1/4
- Click on “evilNinja” in the object tree.
- Select the “functions” tab and scroll down to “evilNinja’s part named key”

Step 3: Object part named key

- Drag that function on top of the **item_from_character** in your instruction

The screenshot shows a programming environment with a sidebar on the left titled "evilNinja's details". It has three tabs: "properties", "methods", and "functions". Under the "functions" tab, there are several functions listed, including "evilNinja is above", "evilNinja is below", "evilNinja is in front of", "evilNinja is behind", "point of view", "evilNinja's point of view", "evilNinja's position", "evilNinja's quaternion", "other", "evilNinja's current pose", "evilNinja's part named key", and "evilNinja's variable named var". The "evilNinja's part named key" function is highlighted with a red box. A red arrow points from this box to the main workspace.

The main workspace is titled "world.my first method No parameters". It contains two loops. The first loop is a "For all" loop over "world.characters", with "every" set to "Obj" and "item_from_characters" together. It contains three actions: "item_from_characters" turn to face "camera" duration = 0.25 seconds, "item_from_characters" move up 1 meter duration = 0.25 seconds, and "item_from_characters" move down 1 meter duration = 0.25 seconds. The second loop is a "For all" loop over "world.characters", with "one" set to "Obj" and "item_from_characters" at a time. It contains one action: "evilNinja's part named key" turn backward 0.25 revolutions. The "evilNinja's part named key" block is highlighted with a green box. At the bottom, there are buttons for "Do in order", "Do together", "If/Else", "Loop", "While", "For all in order", "For all together", and "Wait".

Object part named key (cont 1)

- 1) In the object tree, expand the + beside evilNinja to see that it's body part is named **"leftLeg"**
 - 2) In the turn backward instruction, click on the box and type leftLeg with the same capitalization and spacing as it appears in the object tree – no spacing, the second L must be capitalized
- See the screenshot on the next slide for an illustration

Object part named key (cont 3)

The screenshot displays a game engine interface. On the left, a tree view shows the 'evilNinja' object with its parts: torso, leftLeg, and rightLeg. Below this, the 'evilNinja's details' panel is open, showing a list of properties and functions. The 'functions' tab is selected, and the 'point of view' section is expanded, showing various functions like 'evilNinja is above', 'evilNinja is below', 'evilNinja is in front of', 'evilNinja is behind', 'evilNinja's point of view', 'evilNinja's position', 'evilNinja's quaternion', and 'evilNinja's current pose'. The 'other' section is also expanded, showing 'evilNinja's part named key'. In the center, a 3D view shows a character in a blue environment. On the right, the 'world.my first method' is displayed, showing its parameters and variables. The method is defined as 'world.my first method No parameters' and 'No variables'. The method body contains two loops. The first loop is 'For all world.characters, every Obj item_from_characters together', followed by three actions: 'item_from_characters turn to face camera duration = 0.25 seconds', 'item_from_characters move up 1 meter duration = 0.25 seconds', and 'item_from_characters move down 1 meter duration = 0.25 seconds'. The second loop is 'For all world.characters, one Obj item_from_characters at a time', followed by an action: 'evilNinja's part named leftLeg'. The 'leftLeg' text in the action is highlighted with a red box.

evilNinja

- + torso
- + leftLeg
- + rightLeg

evilNinja's details

properties methods functions

- evilNinja is above
- evilNinja is below
- evilNinja is in front of
- evilNinja is behind
- point of view
 - evilNinja's point of view
 - evilNinja's position
 - evilNinja's quaternion
- other
 - evilNinja's current pose
 - evilNinja's part named key

world.my first method

world.my first method No parameters

No variables

For all world.characters, every Obj item_from_characters together

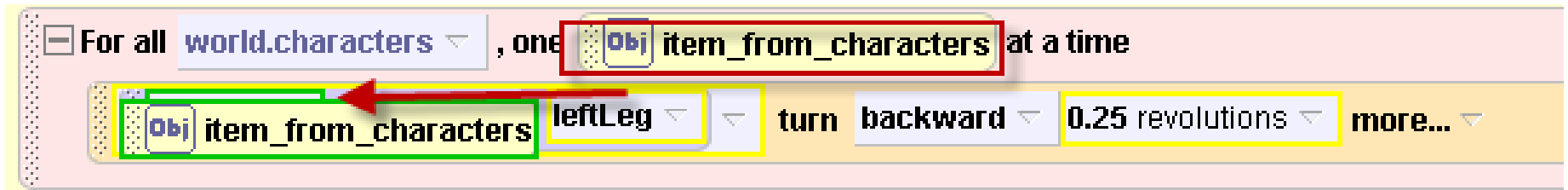
- item_from_characters turn to face camera duration = 0.25 seconds
- item_from_characters move up 1 meter duration = 0.25 seconds
- item_from_characters move down 1 meter duration = 0.25 seconds

For all world.characters, one Obj item_from_characters at a time

- evilNinja's part named leftLeg

For all in order (cont 1)

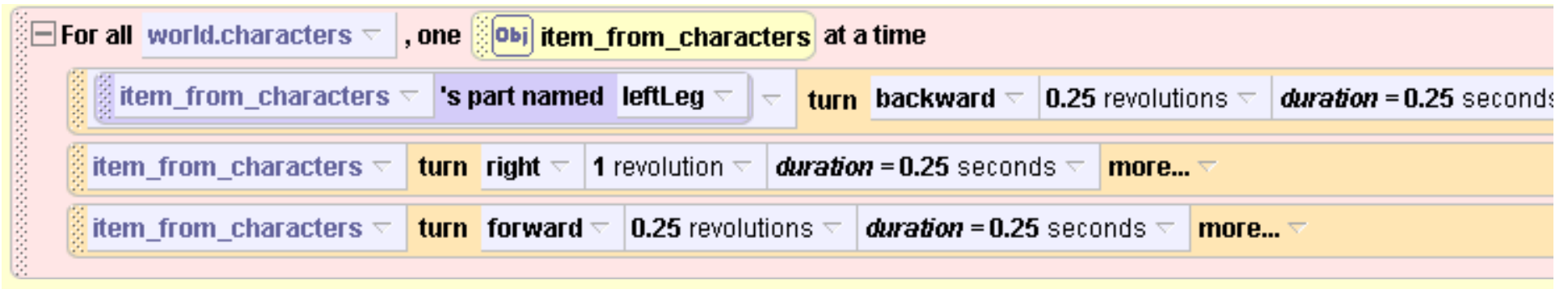
- Drag “item_from_characters” on top of evilNinja



- Drag “item_from_characters” into the “for all in order” again and select “turn right” 1 revolution

For all in order (cont 2)

- Then drag “item_from_characters” again and select “turn forward” $\frac{1}{4}$. Your loop should look like this so far:



The image shows a Scratch 'For all' loop code block. The loop header is 'For all world.characters', with a variable 'item_from_characters' selected from the 'Obj' category. The loop body contains three steps:

Step	Object	Action	Value	Duration	More...	
1	item_from_characters	's part named	leftLeg	turn backward	0.25 revolutions	duration = 0.25 seconds
2	item_from_characters	turn	right	1 revolution	duration = 0.25 seconds	more...
3	item_from_characters	turn	forward	0.25 revolutions	duration = 0.25 seconds	more...

For all in order (cont 3)

- That last instruction should be for the leftLeg only.
- So drag the function “evilNinja’s part named key” on top of the “item_from_characters” and type in leftLeg again.
- Drag “item_from_characters” on top of evilNinja in the “part named key”

The complete method

- Here is the complete method. Don't forget to comment your code

```
// created by Deborah Nelson ▾
```

```
[-] For all world.characters ▾ , every [Obj] item_from_characters together
```

```
  // all of the ninjas move up and down at the same time ▾
```

```
  item_from_characters ▾ turn to face camera ▾ duration = 0.25 seconds ▾ more... ▾
```

```
  item_from_characters ▾ move up ▾ 1 meter ▾ duration = 0.25 seconds ▾ more... ▾
```

```
  item_from_characters ▾ move down ▾ 1 meter ▾ duration = 0.25 seconds ▾ more... ▾
```

```
[-] For all world.characters ▾ , one [Obj] item_from_characters at a time
```

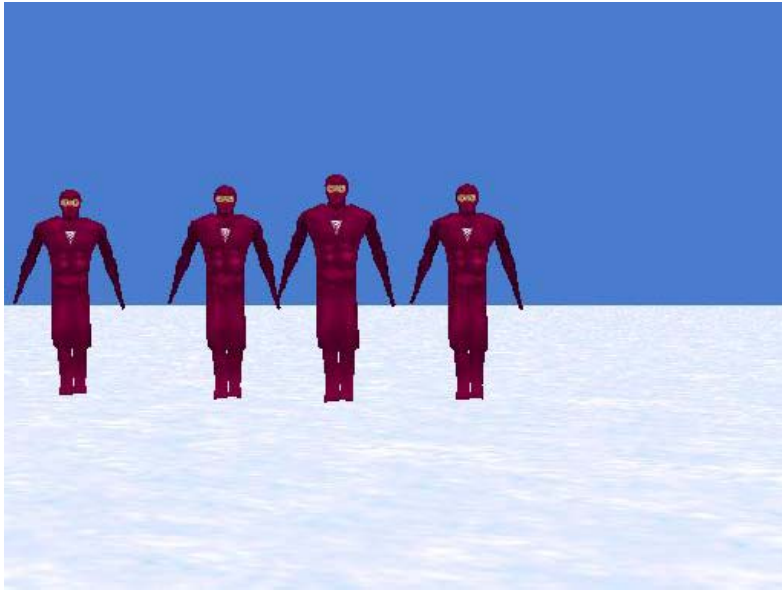
```
  // the ninjas each kick and spin ▾
```

```
  item_from_characters ▾ 's part named leftLeg ▾ turn backward ▾ 0.25 revolutions ▾ duration = 0.25 seconds ▾
```

```
  item_from_characters ▾ turn right ▾ 1 revolution ▾ duration = 0.25 seconds ▾ more... ▾
```

```
  item_from_characters ▾ 's part named leftLeg ▾ turn forward ▾ 0.25 revolutions ▾ duration = 0.25 seconds ▾
```

Play your world now



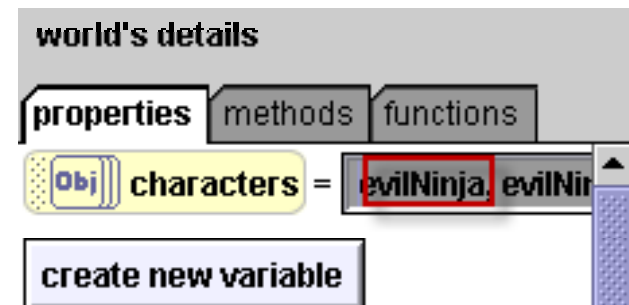
Step 4: Objects with different parts

- So far, our list only has evilNinjas in it. Add the other objects to the list:

1) Click on **world** in the object tree

2) Go to the **“properties”** tab

and click on the box beside characters



1) Click on **“new item”** and select the object you want to add

➤ See the screenshot on the next slide for an illustration

world

camera

light

ground

Scientist_woman

Scientist_man

evilNinja

torso

leftLeg

rightLeg

world's details

properties

characters = evilNinja, evilNi

create new variable

atmosphereColor =

ambientLightColor =

ambientLightBrightness = 1

fogStyle = no fog

fogDensity = 0.1

fogNearDistance = 1 meter

fogFarDistance = 256 meters

Seldom Used Properties

Sounds

Events

create new event

Collection Editor

Values:

item 0 = evilNinja

item 1 = evilNinja2

item 2 = evilNinja3

item 3 = evilNinja4

item 4 = Scientist_man

item 5 = Scientist_woman

new item

Scientist_woman

- camera
- light
- ground
- Scientist_woman
 - the entire Scientist_woman
 - rightLeg
 - leftLeg
 - torso
- Scientist_man
- evilNinja
- evilNinja2
- evilNinja3
- evilNinja4
- Dummy Objects

item_from_characters's part named leftLegturn forward 0.2

Do in orderDo togetherIf/ElseLoopWhileFor all in orderFor all together

Warning

- Play your world.
- If you did not use the same objects as this demonstration, you may get an error highlighting the “parts named” function.
- Adding the **scientist-man** and **scientist-woman** to the list only works because they both have **leftLeg** as the label for one of their body parts
- If your character does not have a part named leftLeg you get the error

Fixing the error

- For example, I've added the **Samurai** (from the web gallery People folder).
- When I add him to my list and play the world, I get the following error:
 - Because the Samurai does not have a part named leftLeg



Fixing the error (cont 1)

- In the object tree, click on the + beside **Samurai**
- Double click on the body part named **Lleg**
- Rename it leftLeg



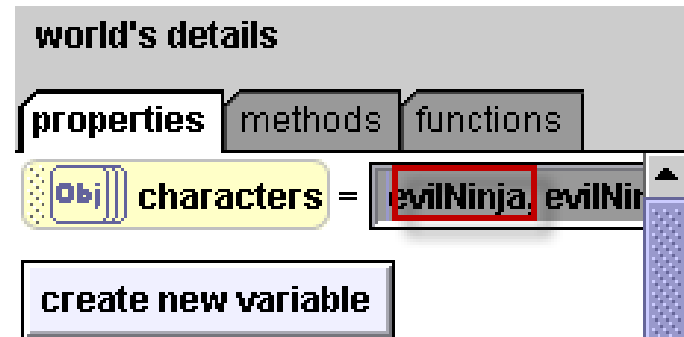
- Now play your world
- Success!

How to remove an obj

- To delete an object from your list:

1) Click on **world** in the object tree

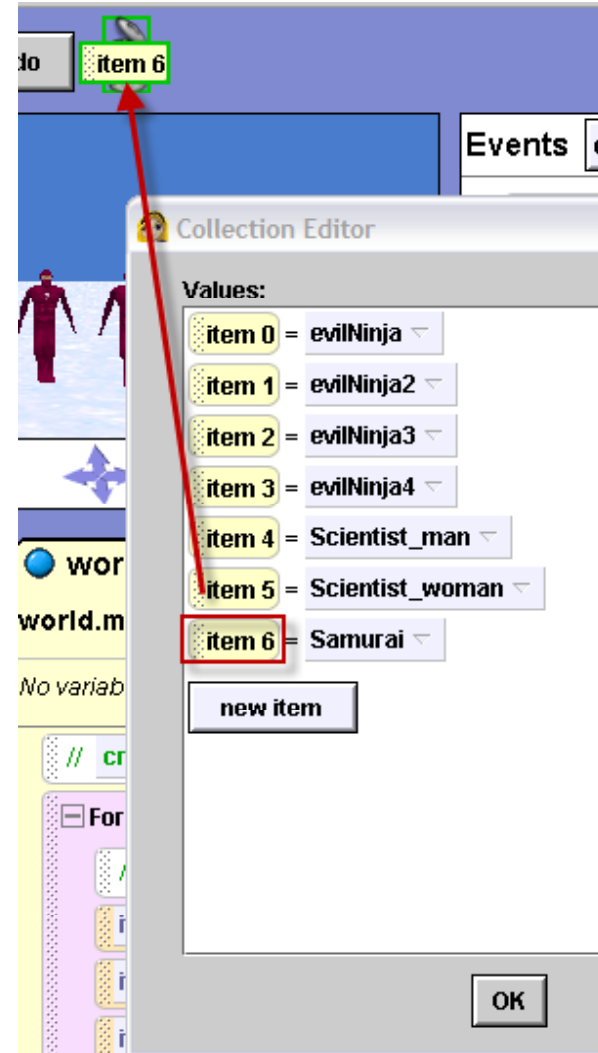
2) Go to the **“properties”** tab
and click on the box beside
Characters



- See the screenshot on the next slide for details.

Deleting an object from your list

- 3) Drag the item you want to delete to the trash can.
- This object is still in your world, but it was removed from the list



Recap

- Lists are useful for having multiple characters perform the same set of actions.
- **For all together** means everything in the list will perform at the same time
- **For all in order** means everything in the list will happen one right after the other
- To make the sub parts of an object move, use the function **part named key**. But make sure all of the characters have the same parts labeled the same way
- WARNING: Do not add too many objects to your list because doing so will slow your world down significantly