Collections

- In some animations, several objects must perform the same actions
  - Example: marching band marching
- It is convenient to collect all objects into a group (collection)
  - Major benefit – write code for all the objects in the group (rather than separate code for each object)

List

- A list - one way to organize objects into a collection
  - You may use lists to organize
    - Shopping list
    - Todo list
- In programming, a list is a collection of objects or information. We call an organizing structure a **data structure**.
Creating Lists

• In Alice, a list can be a list of numbers, or a list of objects, or a list of colors, etc.
• Let’s create a list of skeletons

Programming with a List

• Can “iterate through a list”
  – Do something to each item in the list
    • In order (use “For all in order”)
    • All together (use “For all together”)

Example/Demo: Iteration in Order

For each skeleton in order
skeleton says “Boo”
For each skeleton in order
skeleton turns its head around
Applying a Part of an object

- Drag in skeleton turn
- Select part
- Drag over part
- Drag in item
- Type in part (must spell correctly!)

Example/Demo: Iteration Together

For all skeleton together
  skeleton says “Boo”
For all skeleton in together
  skeleton turns its head and neck around

Add in a girl

- Her parts are almost the same to the head.
  - Rename “body” part to “upperBody”
  - Add her to the list and click “Play”

Add in MadScientist

- His parts are not the same structure as the skeleton, cannot be renamed to match.
  - What happens if we put him in the list and Play?
  - Alice bug – cannot delete from a list, should be fixed now in newest version!
Selecting an item from a list

- You can select a random item or a specific item from a list.
- This code makes a particular skeleton jump.

```
skeleton \ move up \ 1 meter \ more... \\
```

- Suppose we want to have one item from our list (chosen randomly) to jump up and down. How would we do that?

List Questions

- What are differences between *For all in order* and *For all together*?
- Why is the list a world variable?
- When would you want to use each of them?
- What can you put in a list?
- When can you refer to a part of an object in a list?
- What type of method can you not put in a *For all in order* or *For all together*?

Classwork today

- Create a list of players
- Make them do several things (See handout).
Solution to having a random object from a list jump

- Add a variable called `jumper`
- Drag over and set the variable “jumper” to skeleton temporarily

```
world.jumper set value to skeleton
skeleton move up 1 meter
skeleton move down 1 meter
```

Solution (cont)

- Drag over the list scaryThings and drop it on skeleton. You can choose which item in the list. Select “random item from list”

```
world.jumper set value to random item from scaryThings
world.jumper move up 1 meter
world.jumper move down 1 meter
```

Solution (cont)

- Then change “skeleton” in the move commands to “world.jumper”

```
world.jumper set value to random item from world.scaryThings
world.jumper move up 1 meter
world.jumper move down 1 meter
```

- Play a random object from your list will jump each time this code executes.