

Scratch Primary Lesson 3

Help the Cat Escape

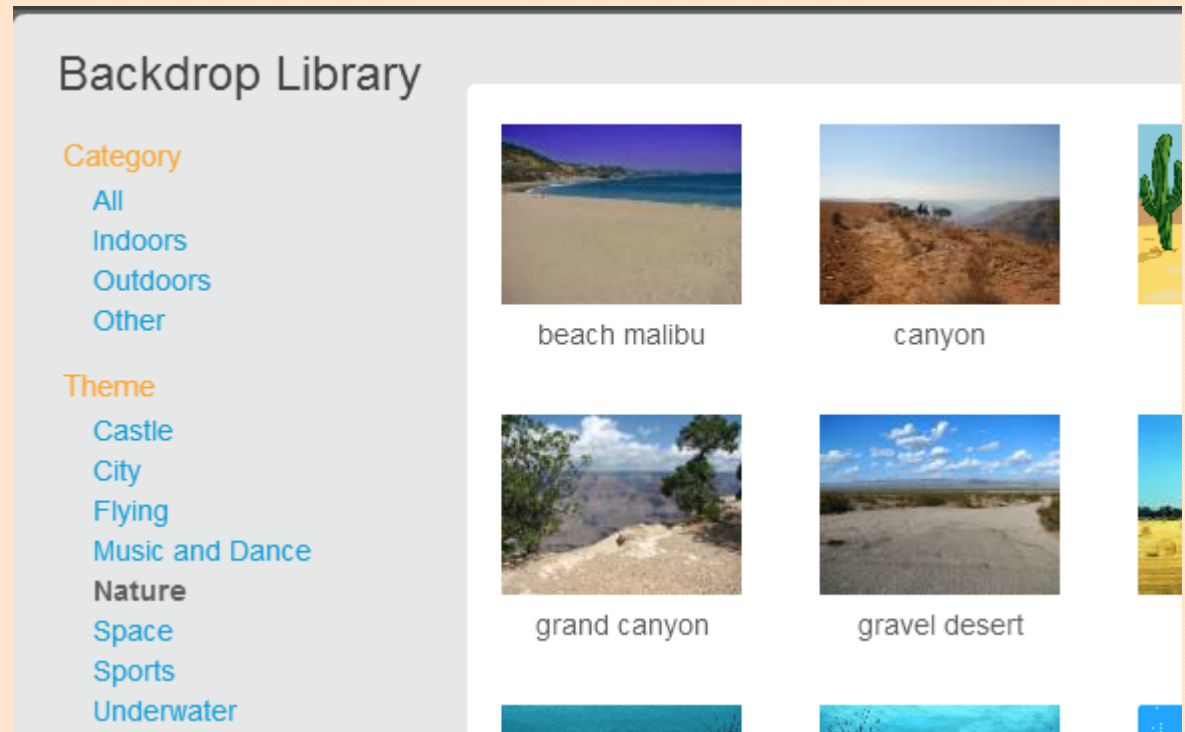
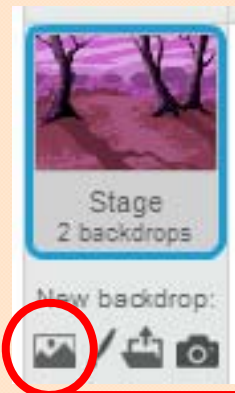
Help the Cat Escape

- Start up your “Cat and Bat” project from the last lesson.
 - If you don’t have it, use this project:
<http://scratch.mit.edu/projects/12624773/>
- Click the green flag and hit the space key to run the project.
- The cat is stuck in the woods.
- Lets help him escape from the bat:



Help the Cat Escape

- We would like to help the cat escape away from the bat in the woods so that the story has a happy ending.
- Where can the cat go? Find a backdrop in Scratch to where you'd like the cat to go:



Changing the Scene

- When the cat touches the edge of the stage, we want him to go into the scene that you've chosen and escape from the bat.
- To change the scene when the cat touches the edge we need to know:
 - HOW does the cat know it is touching the edge?
 - HOW does something happen when is the cat is touching the edge?
 - HOW does the stage know when to change the backdrop when the cat is touching the edge?



Design the Story

- Write down everything that we want to happen.
 - The cat, bat, and the stage are the actors.



The Cat:

- broadcasts a message when he has hit the edge of the stage and says something.



The Bat:

- receives the message and hides and stops.

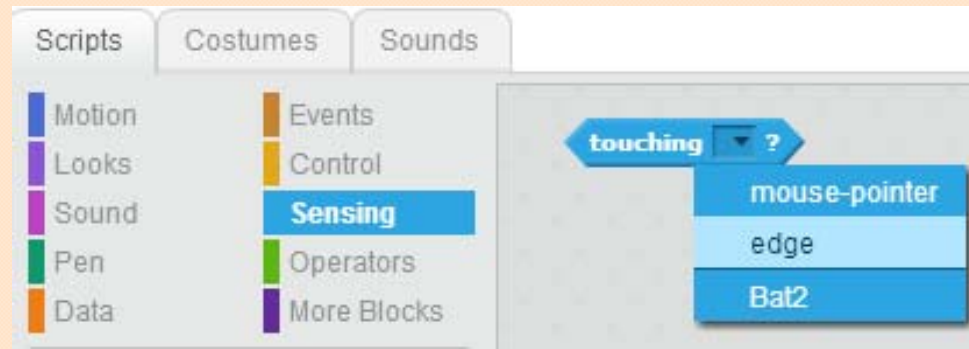


The Stage:

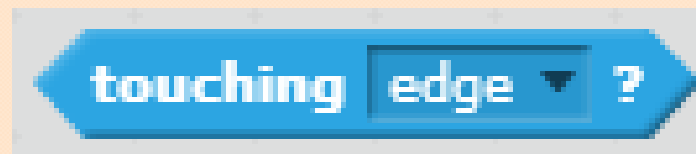
- receives the message and changes the scene.

How Does the Cat Know When it is Touching the Edge?

- In Scratch, we have a blocks that can sense when a sprite is touching things:



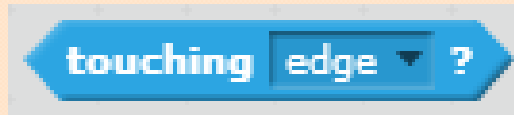
- Set the “touching [_] ?” block to sense the edge:



True or False?

- Think about this question:

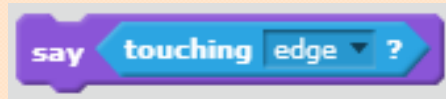
“Is the cat touching the edge?”



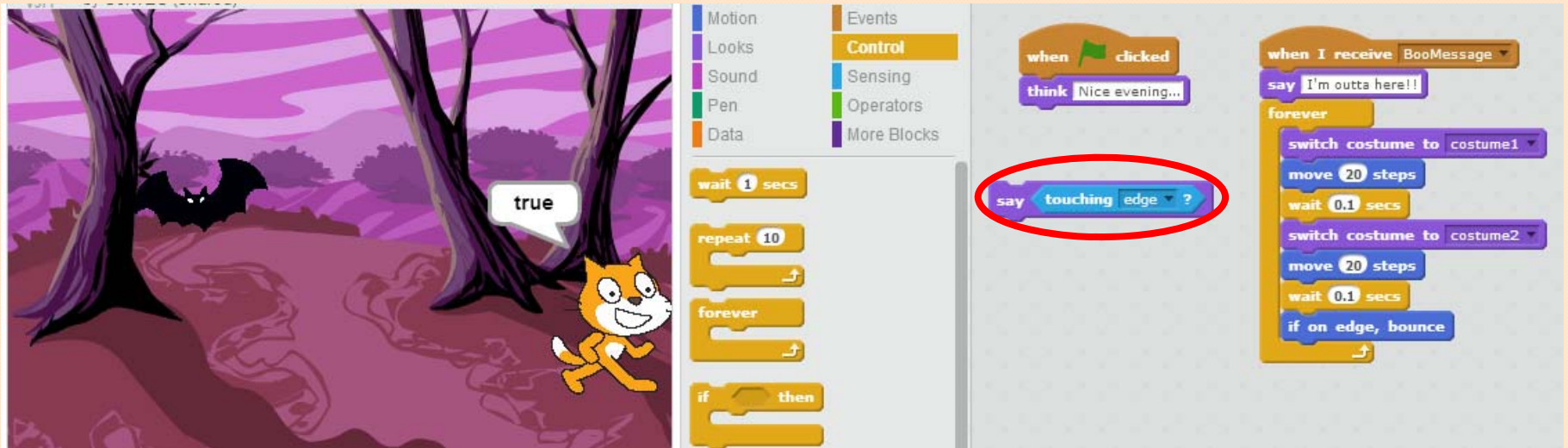
- How many possible answers can there be?
 1. Yes = True
 2. No = False
 3. Maybe = ??
- Can there be any more answers besides “True” or “False”?

Test the “Touching” Block


- Let’s see the “touching” block in action and see if it works the way we expect.
- Create this block and place it in the cat’s script area:

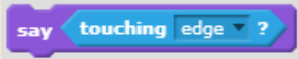


- We can run this block without running the other cat scripts by clicking on it with the mouse:



Test the “Touching” Block

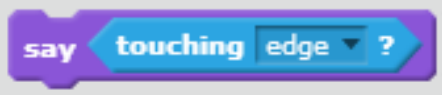
- Stop all scripts. . They do not need to be running.
- Use the mouse to drag the cat as follows:

- Drag the cat to touch the edge then click on the  block:




- Drag the cat away from the edge then click on the  block:



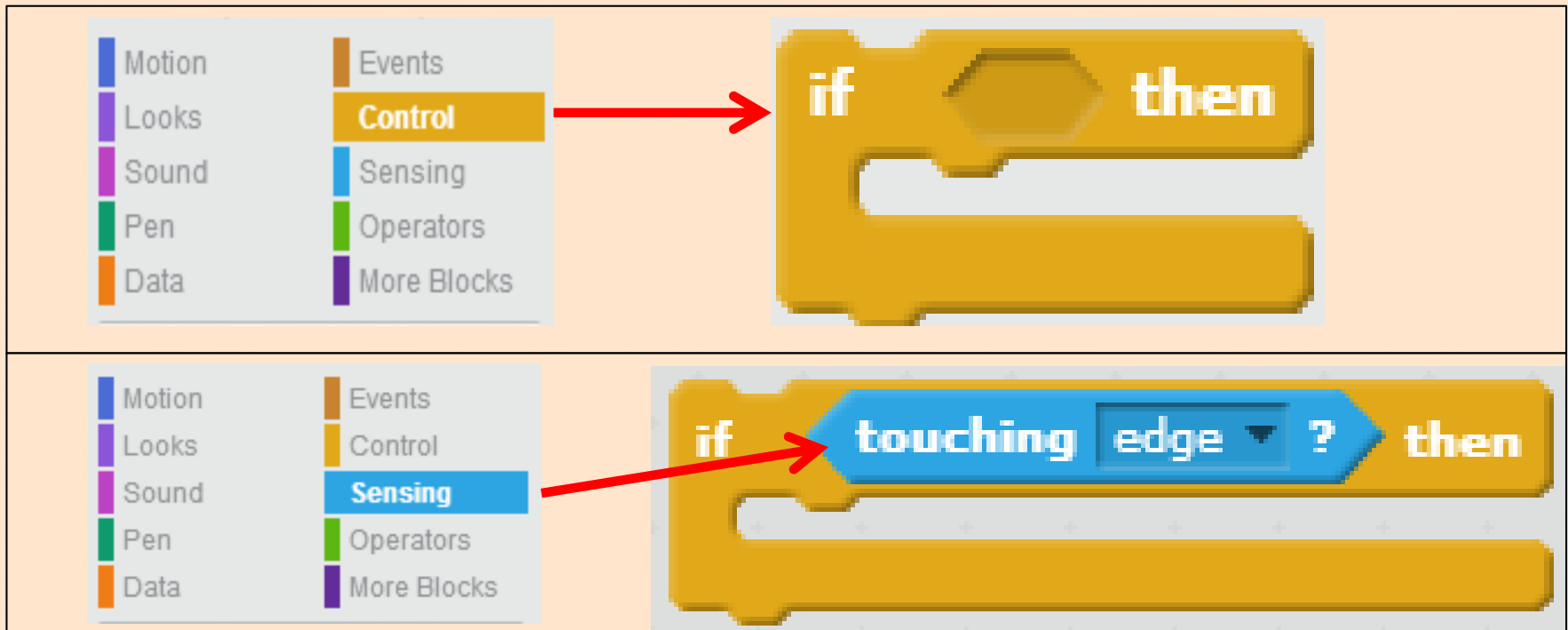
- We have tested the  block and it is doing what we want it to do.
- This is called “Unit Testing” because the block is a “unit” and we have tested the block all by itself to make sure it works.

How Does Something Happen When the Cat Touches the Edge?

- Remember the  block? It changes the cat's direction when it has touched the edge.
- But we want to do something different...

How Does Something Happen When the Cat Touches the Edge?

- We have to create our own “If touching edge” block using the “If <-> then” control block:



The “If” Statement

- The “If” statement asks whether a condition is true or false:



- If the condition is **True**, then the script inside the “If” block is run. Here the cat is touching the edge so he runs the speech script inside the if block:



- If the condition is **False**, then the script inside the “If” block is not run. Here the cat is not touching the edge so the whole “If” block is skipped.



Binary Logic and the “If” Statement

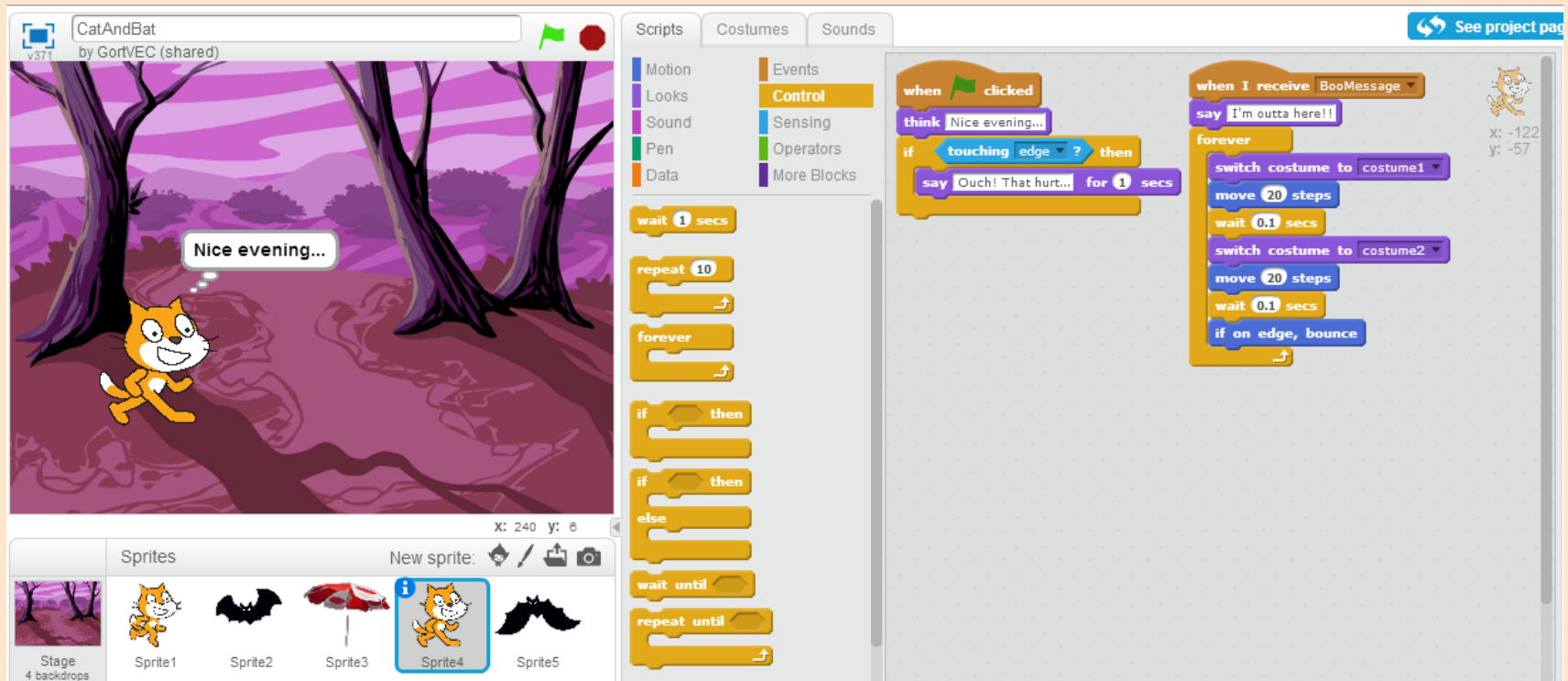
- The “If” statement is a very important tool in computer programming.
- Computers are built to make decisions based on true or false conditions. This is also represented as 1 for true and 0 for false.
- Since computers only have to think about two possibilities, they can make more than 1 billion true/false decisions in 1 second.
- This is faster than the human brain!
But don’t worry, our brains can do many more things at the same time than computers can.
And computers have to be told what to do.

True = 1
False = 0



Putting it All Together

- Now that we know our edge touching script is working, we can place it into our story so that it works during the story.



Run the Story

- Start the story with the green flag and make the bat appear.
- We expect the cat to say “Ouch! That hurts...” every time he hits the edge.
- What is happening instead? What is this script doing?



Debugging

- The cat is not saying “Ouch! That hurt...” when he hits the edges. This is known as a “bug”.
- A bug is when a computer program is not doing what is supposed to do.
- We have to find the bug and fix it. This is called “debugging”.
- In order to debug the cat’s script, we have to look at it and think about it *very carefully*:



Debugging

- *Exactly* what is this script doing?



Think "Nice evening..."

Check if touching edge

If touching edge say "Ouch!..."

If not touching edge, skip it

Finished

- Do you see the problem?
 - Hint 1: How many times does this script run?
 - Hint 2: Place the cat on the edge, then click the green flag.
 - Why will it work for only one time when the cat is on the edge?



Debugging – Found the Bug!

- The script is checking if touching edge *only once*.



Think "Nice evening..."

Check if touching edge

If touching edge say "Ouch!..."

If not touching edge, skip it

Finished

- After the script is finished it never checks for touching the edge again.
- We want the computer to keep checking over and over again forever.
- This is known as "Polling".

Polling

- Polling means to ask questions and get results.
- We want the computer to keep asking this question over and over again:

“Is the cat touching the edge?”

- We can do this with a forever loop:



- Put this forever loop into the cat's script. Run it and see what happens now.

Where Are We?

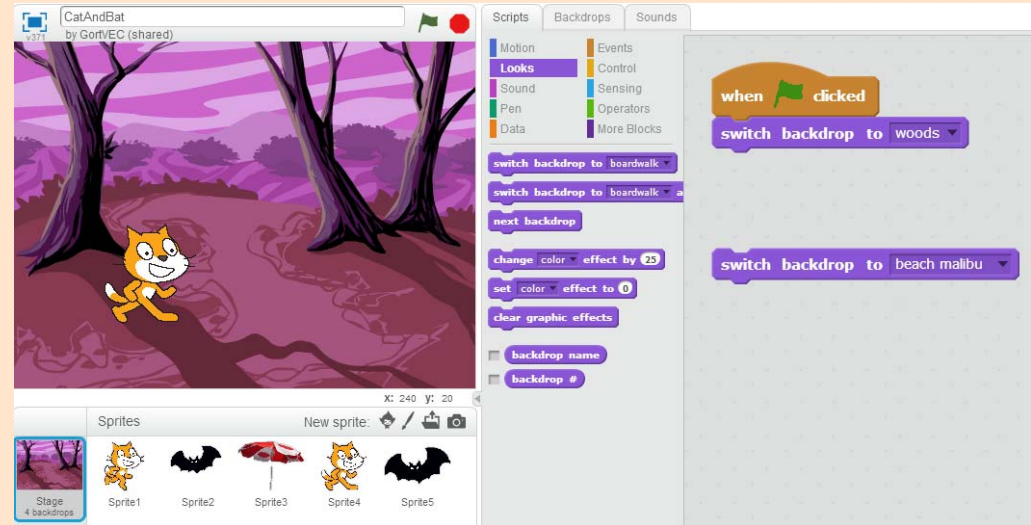
- We have learned:
 - How to make the cat know it is touching the edge.
 - How make something happen when the cat is touching the edge. “Something” that happens is called an “event”.



- Now we need to know how to change the scene when the cat touches the edge...

How Does the Stage Know When to Change Scene?

- We can write a script that changes the scene. The stage has it's own script area:



- How are we going to change the backdrop when the cat is touching the edge of the stage?
 - Hint: Do you remember how the cat knew when to start running away from the bat?

How Does the Stage Know When to Change Scene?

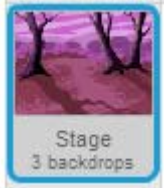
- The stage can receive broadcasts from the cat.
- First, we can program the cat to send a broadcast every time he touches the edge:

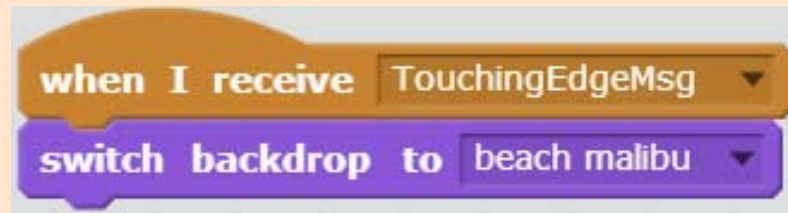


- Create a new broadcast message:
- Place it in the script which is run when the cat touches the edge:



Changing the Stage Backdrop

-  The stage must receive the broadcast message when the cat touches the edge:



- The stage will switch the background when the broadcast message is received
- Always start with the woods backdrop at the beginning of the story:



Run Your Story

- Click on the green flag, then press the space key to make the bat appear.
- The scene should now change when the cat runs away and touches the edge.
- But the cat has not escaped from the bat:
 - We need to make the bat disappear when the scene changes...

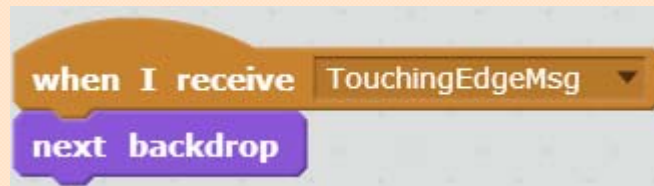


Escape From the Bat

- The bat needs to hide when it receives the “TouchingEdge” broadcast message:

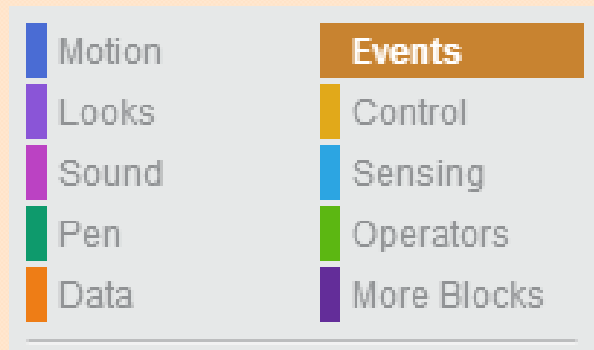


- Fun Stuff:
 - Add more backdrops to the stage.
 - Switch to the next backdrop every time the cat touches an edge:

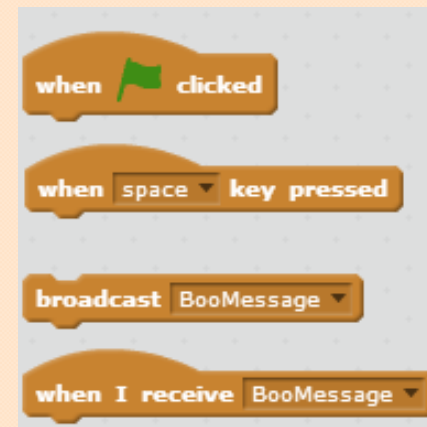


Events

- In computer programming, something that happens is called an “event”.



- We have learned about and used these events:
 - Green flag start block:
 - Key press:
 - Broadcasting:



Congratulations!

- We have created a story together.
- Don't forget to save your work:



- You can now create you own stories using the Scratch programming skills you learned from this story.
- Have fun!