Functions in Alice

Definition: A function is a special type of method that returns a value back to the instruction that called the function.

What is a Function?

A function is very similar to a method, except that a function returns a value, while a method does not. The value that a function returns is similar to a variable. Like a variable, a function can be used as a parameter for a method or another function.

In Alice, there are primitive functions associated with all objects, including the world object. To see the available functions, select the object and in the Details Panel (bottom left panel) select the “functions” tab.

The functions are separated into the following categories: boolean logic, math, random, string, ask user, mouse, time, advanced math, and other.

Functions For User Input

One of the most basic uses for functions in Alice is to ask the user to provide input. The three most common types of data requested from the user are numbers, strings, and boolean (yes/no or true/false).

Because functions return a value, they cannot simply be used the same way a method is used. Instead, they must be used as part of a method or instruction that will use the return value.

Exercise 1 – Asking the User To Input a Number

1. Open the PenguinTutorial02.a2w world from the Variables in Alice lesson.
   The current code has numberJumps set to 2. We are going to replace this with a value that the user specifies.

2. Click on the world object and select the functions tab.

3. Drag the ask user for a number function into the box where we currently have the value 2.
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4. Run your program.

5. The program currently starts with 5 jumps. Add a second set value at the beginning of the program. This time, modify the question to be something a little more specific to the situation, such as “How many times should the penguin jump?”

Save this world as PenguinTutorial03.a2w

There are three world functions for user input:

1. ask user for a number

2. ask user for yes or no – this is boolean data, also referred to as true/false data

3. ask user for a string

Primitive Object Functions

Each object in Alice comes with a set of primitive functions. The best way to learn about these functions is to explore them as you load various objects. In general, you will see they fall into the following categories:
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1. Proximity – return values indicating an object's proximity (distance) to other objects

2. Size – return values related to the size of the object

3. Spatial Relation – return values indicating the object's position in the world relative to other objects

4. Point of View – return values related to the object's point of view

5. Other – return miscellaneous values

Exercise 2 – Using a Proximity Function

The following pseudocode outlines our algorithm:

- penguin turns to face the hole
- penguin walks the distance to the centre of the hole
- penguin falls down into the hole

1. Create a new snow world with a Penguin (Animals) and a hole (use the Circle from Shapes).

2. Have the penguin turn to face the hole (turn to face method).

3. Have the penguin walk toward the hole (forward) using the walking method. This is a custom method already written for the penguin class. For now, leave the parameter for x = 1.

4. We don't want the penguin to walk 1 metre... we want it to walk the distance to the hole. Make sure the penguin object is selected and find the function penguin distance to, and then drag it over the “x = 1” parameter in the walking method. Set the other object to circle since that's where we want the penguin to go.

5. Have the penguin fall down. Try moving the penguin and the hole to different locations and ensure that the program always works correctly.

Save this world as PenguinTutorial04.a2w