Nonvisual Arrays

Hello, the function is $2x + 1$...

by Chris Brown
under Prof. Susan Rodger
Duke University
June 2012
Nonvisual Arrays

• This tutorial will display how to create and use nonvisual arrays in Alice. Nonvisual arrays can be an array of any object or data type that don’t necessarily have to be in order in the world. In this world, we will fill the array with solutions to the equation $2x + 1$ and have the user calculate the answers for random integer values of $x$. 
Standards

**CSTA Standard 5.3.B**- Computer Science Concepts and Practices (CT): Students will be able to...“6. Compare and contrast simple data structures and their uses (e.g., arrays and lists).”

**NC Standard Course of Study Mathematics Grade 6**-

**Goal 5**: The learner will demonstrate an understanding of simple algebraic expressions.

**Objective 5.0.2**: Use and evaluate algebraic expressions.
Set Up

• Click on the “Add Objects” button. For this world, all you will need to add is the MadScientist character under the “People Heading” in the Local Gallery and a 3D text object to keep score. Right now, set the text to be 0.
Now we’re ready to start building the array. Make sure that world is selected in the object tree, and then go to properties under world’s details. Click the “create a new variable” button and call this variable array. Make sure that it is a number variable and that you check the box for “make a” and select Array. Leave the array empty for now.
Next, we’ll see how to fill in the array. Suppose we want an array with all of the solutions to the equation “$2x + 1$” from 0 to 50. Add a loop from the bottom of the editor into the method and enter 51 as the end value $[0, 50]$ by selecting “other…” in the menu and typing 51 into the calculator that pops up.
Function

• In the world’s details pane, go under “functions” and create a new function that returns a number. Name this function *calculate*. In here, we will calculate the values to be put in the array.
This function will need a parameter to pass in different values to calculate. Click on “create a new parameter” on the right and name this number parameter *num*. 
Function

- Where the function returns 1, click on the drop down arrow, choose “other…”, and select 2. Then go back to the same menu next to the 2 and select “math” → “2 *” → “expressions” → `world.calculate.num`. 
Function

• Now, click on the arrow next to “Return (2 * num)” and go to “math” → “(2*num) +” → “1” to create a function that calculates 2x + 1.
Filling in the Array

- Go back to world.my first method. Under world properties, drag the array variable into the loop and select “set item <index> to <item> in world.array”. Select index to be the index and world.calculate to be the item, both under “expressions”.
Filling in the Array

• Now, click on “show complicated version” on the loop in the method.

• Where the command in the loop says “world.calculate num=1”, drag the “index” object in the loop over it.
Filling in the Array

• You are going to want to speed up this process, otherwise filling in 50 values in the array will take a while. Click on “more…” at the end and go to duration and set the value to something very small like .25 seconds.
Complete the World

• Now that the array is filled, we want to choose random values of x and then ask the user to input the solution of the equation at the given value of x, keeping score with how many they get right. Try this on your own, a basic solution is on the next slide.
Answer = 1, x = 1, score = 1

MadScientist say Hello, the function is 2x + 1...
duration = 3 seconds

Loop index from 0 up to (but not including) 51 times incrementing by 1
set item index to world.calculate num = index in world.array
duration = 0.001 seconds

Loop infinity times
tax x set value to random number minimum = 0 maximum = 50 integerOnly = true
madScientist say Solve for y.
answer set value to ask user for a number question = y joined with world.func joined with , x joined with x as a string

If answer == item x from world.array
madScientist say That is correct!
increment score by 1

Else
madScientist say That is incorrect...
decrement score by 1

scoreText set text to score as a string
Challenges

• Make a similar world and change the function to a different equation such as $y = 3x + 5$ or $y = x^2 + 2x - 1$. 