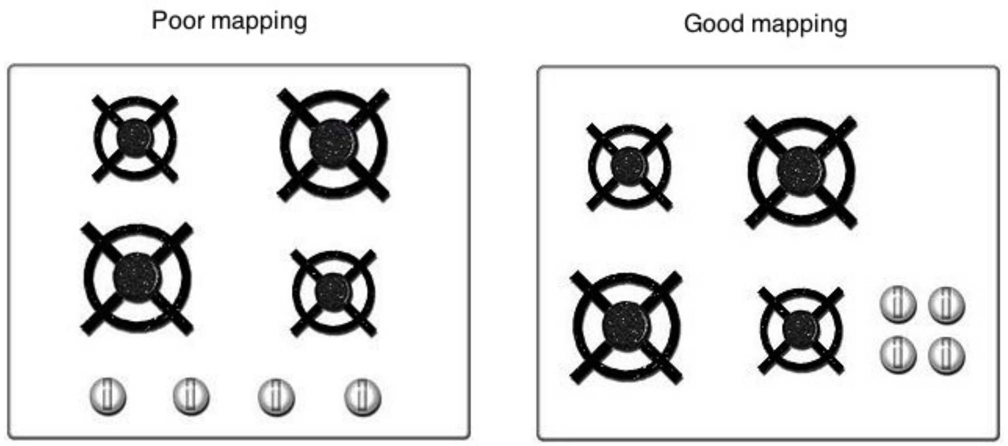
CS7025 Programming for Digital Media

Lesson 2 – Variables – Functions – Conditions

Design Principles
Don Norman

- Feedback
- Mapping
- Visibility
- Constraints
- Consistency
- Affordance



https://medium.com/@sachinrekhi/don-normans-principles-of-interaction-design-51025a2c0f33
accessed 2022-09-19 15:25

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Problem Solving

- Programming == Solving Problems
- Abstractions –> Driving a car
- Make, Model, Engine, etc.

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Problem Solving

- Drive a car until you approach a traffic light.
- When the traffic light is red, stop driving the car.
- When the traffic light is green, continue driving.

Verb -> function(){}

Noun -> Object or Variable

Condition -> TRUE/FALSE

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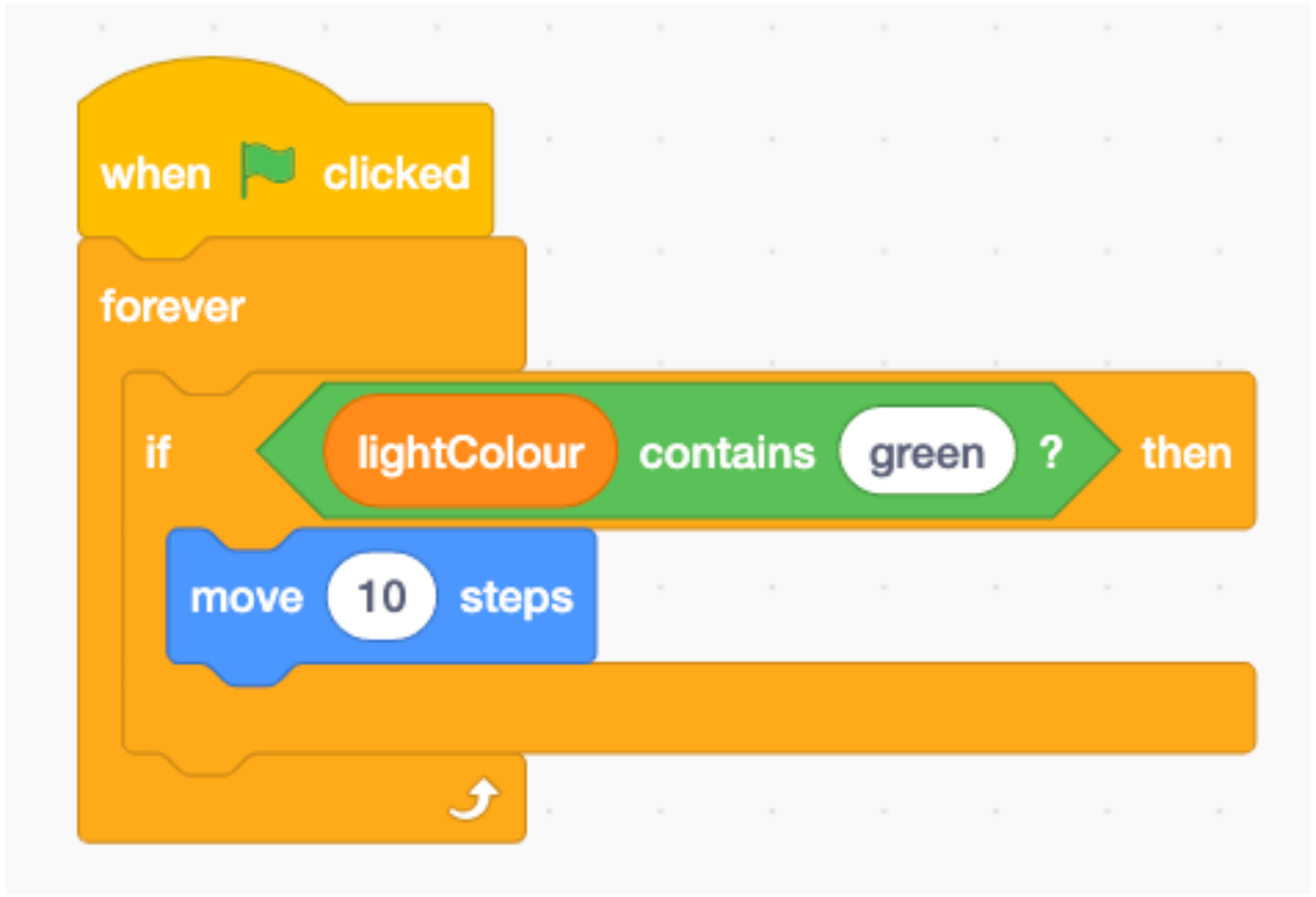
Recap



```
when [flag] clicked
forever
    if <(lightColour) contains (green) ?> then
        move (10) steps
```

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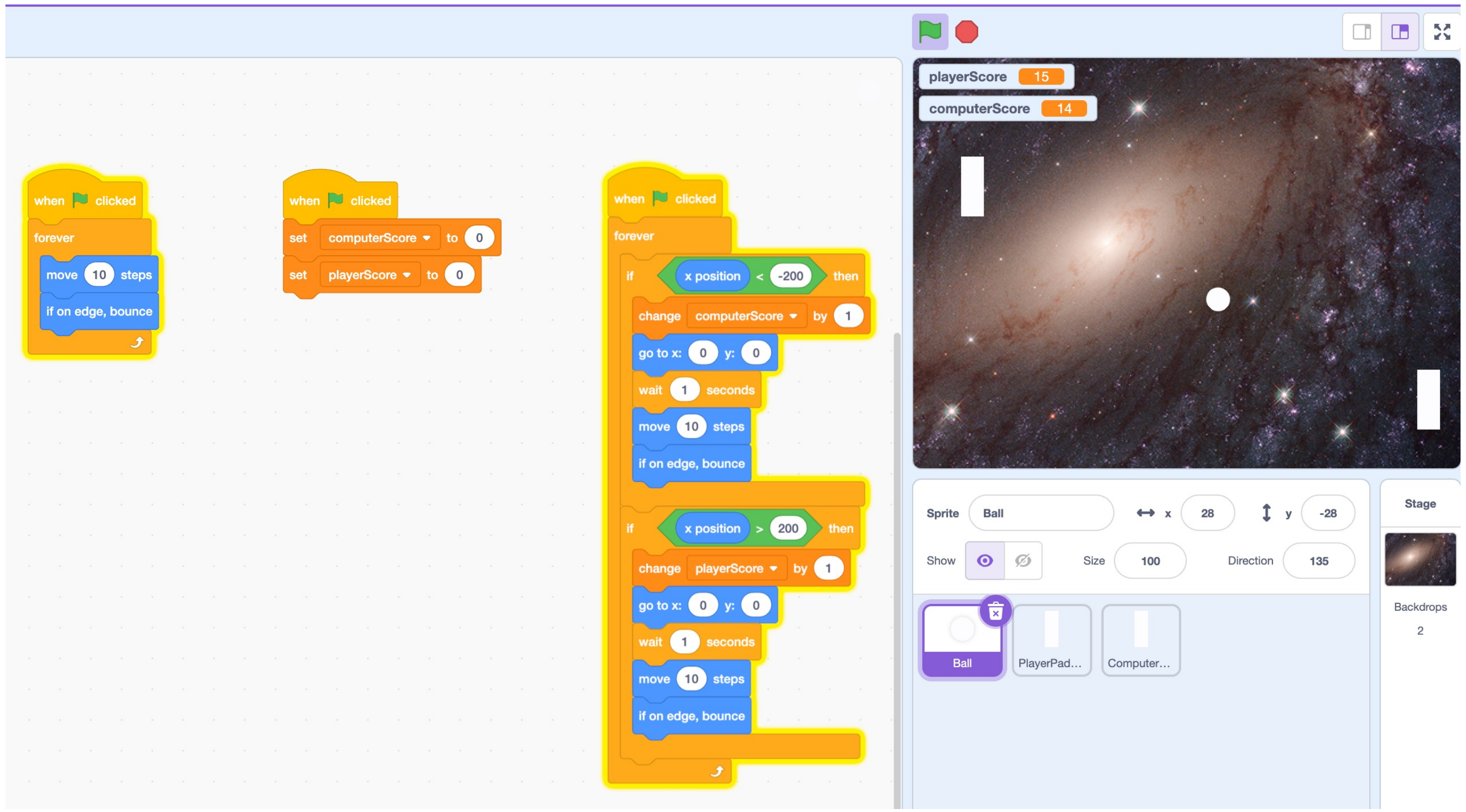
Scratch - Pong



```
when 🏁 clicked
forever
    move 10 steps
    if on edge, bounce
```

```
when 🏁 clicked
set computerScore to 0
set playerScore to 0
```

```
when 🏁 clicked
forever
    if x position < -200 then
        change computerScore by 1
        go to x: 0 y: 0
        wait 1 seconds
        move 10 steps
        if on edge, bounce
    if x position > 200 then
        change playerScore by 1
        go to x: 0 y: 0
        wait 1 seconds
        move 10 steps
        if on edge, bounce
```

playerScore 15
computerScore 14

Sprite Ball x 28 y -28
Show Size 100 Direction 135

Ball PlayerPad... Computer...

Stage
Backdrops 2

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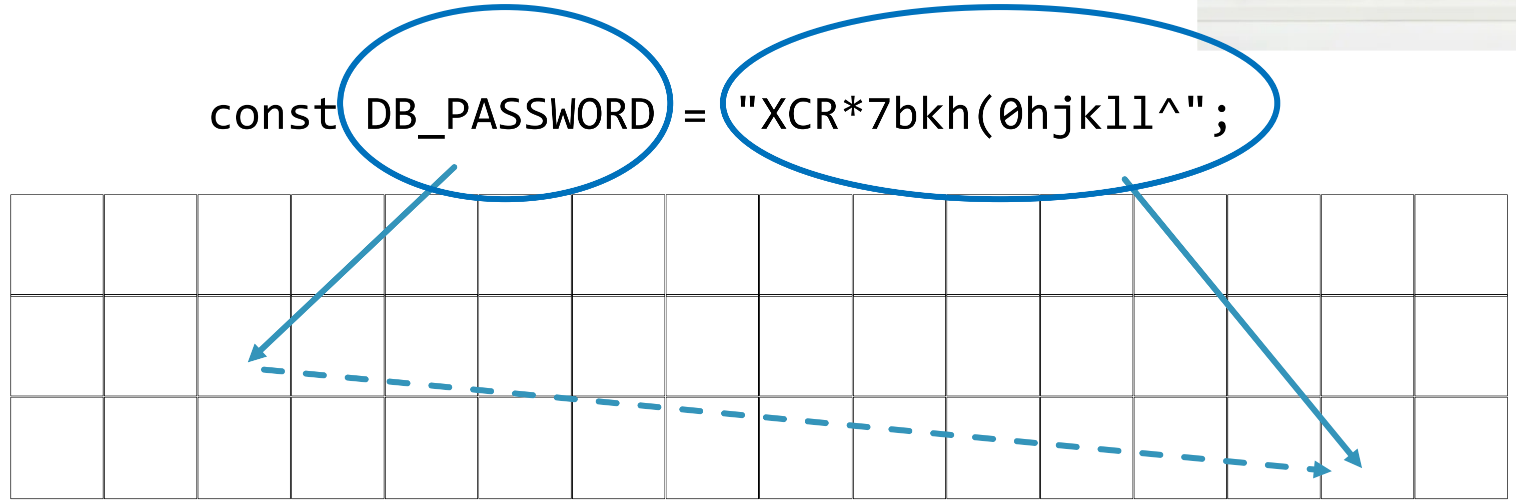
Variables

Variables are things - nouns

- Keyword
- Type
- Name
- Value

```
const DB_PASSWORD = "XCR*7bkh(0hjkll^";
```

Keyword
Type
Name
Value



```
const DB_PASSWORD = "XCR*7bkh(0hjkll^";
```

Variable Keyword

Variable Keywords:

- var // global variable accessible everywhere
- let // accessible within scope
- const // immutable, known at compile-time
- final // immutable, known at run-time
- static // accessible class variable without the need to instantiate

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Variable Types

String	represents textual data	`'hello', "hello world!" etc.`
Number	an integer or a floating-point number	`3, 3.234, 3e-2 etc.`
BigInt	an integer with arbitrary precision	`900719925124740999n , 1n etc.`
Boolean	any of two values: true or false	`true and false`
undefined	variable is not initialized	`let a;`
null	denotes a null value	`let a = null;`
Symbol	instances are unique and immutable	`let value = Symbol('hello');`
Object	key-value pairs of collection of data	`let student = { };`
Array	list of data	`let list = ['milk','bread',…];`

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Variable Type String

- A String is a list of characters surrounded by
  'quotes',
  "double quotes" or
  `back ticks`

```
let name = 'Ronald';

let address = 25 + " Herbert Park Road";

let age = 25; //a number
    age = age.toString();
```

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Variable Type BigInt

- If you need more a bigger number, you can use a BigInt.
  A BigInt number is created by appending n to the end of an integer.

```
let value1 = 9007199251247409998n;

let newValue = value1 + 1n;
```

- You can't add a Number to a BigInt

Variable Type Number

- A Number is an integer or a double or float

```
let age = 25;
let height = 1.85;
let weight = parseInt('80');
```

- Numbers go up to 253 - 1 //9.0071993e+15

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Variable Type Boolean

- Booleans are either one thing or another true or false, on or off, 1 or 0

```
let checkCompleted = false;
let passedSecurity = true;
```

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Variable Name

- Naming is hard!
- Be descriptive, write for the next programmer who is going to work with your code, or yourself one year from now.
- Don't write names that are too short:
  Consider `var pr` vs `var patientRecord`
- or names that are too long:
  `var patientOfThisHospitalRecord`
- Be consistent, use either `camelCasing` or `underscores_for_naming` variables, when you choose one, keep using that format for the rest of your code

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Variable Name

- Variable names are made up of Unicode letters
- Cannot start with a number
- Cannot contain a space or a hyphen (-)
- Are case sensitive `firstName != FirstName`
- Don't use reserved words

Reserved Words

else	as	const	export	get	null	target
async	continue	extends	in	of	this	while
await	debugger	false	import	return	throw	with
break	default	finally	in	set	true	yield
case	delete	for	instanceof	static	try	
catch	do	from	let	super	typeof	
class	function	new	switch	var	void	

Variable Type undefined

- Undefined is when a variable holds no value

```
let name;
console.log("name", name);
```

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Variable Type null

- When a variable is empty or unknown

```
let databaseContents = null;
```

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Variable Type Symbol

- A Symbol is a variable with a unique immutable value

```
const value1 = Symbol("Hello World");
const value2 = Symbol("Hello World");

value1 == value2 // returns false
```

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Variable Type Object

- Objects key value pair collections of data

```
let student = {
   id: "123A45670",
   name: "John Smith",
   age: 25
};
```

- Access items like so:

```
console.log("Name", student.name);
```

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Variable Type Array

- Arrays hold lists of data

```
let shoppingList = ['milk', 'bread', 'butter', 'eggs', 'salt', 'sugar',
'bacon'];
```

- Items in an array have an index. Arrays are zero-indexed which means the first element is number 0, the second 1, etc.

- Access items in an array like so:

```
console.log("second item", shoppingList[1]);
```

Functions

Functions do things

- In JavaScript methods are functions, functions are declared once and can be activated multiple times.
- To declare a function, start with the keyword function, a name parentheses () and brackets {}

```
function doSomething(){
    console.log("Hello World!");
}
```

Functions

Functions can return things

```
var studentName = "Robert";

function doSomething(){
   return studentName;
}
```

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Functions

Functions can process things

```
function doSomething(parameter){
   return parameter;
}
console.log(doSomething("Hello World")) // returns "Hello World"

function sum(a, b){
   return a + b;
}
console.log( sum( 5, 2 ) );    // returns 7
```

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Functions

- Whatever statement or condition is included within the brackets of a function are executed when the function is called. Functions can be called or nested within other functions.

```
function sum(a, b){

   console.log("a", a, "b", b);
   return a + b;

}

console.log( sum( 5, 2 ) );    // returns 7
```

Conditions

- && // AND
- || // OR

```
Let a = 1;
let b = 5;
if( a >= 1 && b < 6) { //do something }
if( a >= 1 || b >= 4) { //do something }
```

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Conditions

- When you need to figure out the value of a variable or the outcome of a function so you can change the flow of your program you need a conditional comparison

```
if ( something == true )   {    // always returns true or false
    // do something
}
else{
   // do something else
}
```

Iterating Through a Collection

```
for ( let i = 0; i < 10; i++ ) {
      console.log( i );
}

while ( 1 > 0 ) {
      console.log("this runs forever");
}
```

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Try it yourself

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Variables

- Create a set of variables
- Think about the names you give them and what value they hold
- Change the values of some of your variables
- Create an array with 5 items, list the second and third items

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Functions

- Create a variable playerScore
- Create a function that adds one to the playerScore variable (like the player score or computer score we created last week in scratch) every time the function is called
- Create a function that displays the value of the playerScore variable

Conditions

- Check if the playerScore value you created is odd or even
  // you can use % which gives you a 'rest' value
- If it's odd display a different message than when it's even

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Thank You

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