1 - Global Context

When 'this' is not inside of a declared object

```
console.log(this) // window

function whatIsThis(){
    return this
}

function variablesInThis(){
    // since the value of this is the window
    // all we are doing here is creating a global variable
    this.person = "Elie"
}

console.log(person) // Elie

whatIsThis() // window
```

this: default **windows(browser)**

Nested Objects

What happens when we have a nested object?

```
var person = {
    firstName: "Colt",
    sayHi: function(){
        return "Hi " + this.firstName;
    },
    determineContext: function(){
        return this === person;
    },
    dog: {
        sayHello: function(){
            return "Hello " + this.firstName;
        },
        determineContext: function(){
            return this === person;
        }
    }
}
```

```
person.sayHi() // "Hi Colt"
person.determineContext() // true

// but what is the value of the keyword this right now?
person.dog.sayHello() // "Hello undefined"
person.dog.determineContext() // false
```

this assign to person

this assign to dog

What about Apply?

It's almost identical to call - except the parameters!

```
var colt = {
    firstName: "Colt",
    sayHi: function(){
        return "Hi " + this.firstName
    },
    addNumbers: function(a,b,c,d){
        return this.firstName + " just calculated " + (a+b+c+d);
    }
}

var elie = {
    firstName: "Elie"
}

colt.sayHi() // Hi Colt
colt.sayHi.apply(elie) // Hi Elie

// well this seems the same....but what happens when we start adding arguments?
```

```
colt.addNumbers(1,2,3,4) // Colt just calculated 10
```

```
colt.addNumbers.call(elie,1,2,3,4) // Elie just calculated 10
```

```
colt.addNumbers.apply(elie,[1,2,3,4]) // Elie just calculated 10
```

And what about bind?

The parameters work like call, but bind returns a function with the context of 'this' bound already!

```
var colt = {
    firstName: "Colt",
    sayHi: function(){
        return "Hi " + this.firstName
    },
    addNumbers: function(a,b,c,d){
        return this.firstName + " just calculated " + (a+b+c+d);
    }
}

var elie = {
    firstName: "Elie"
}
```

```
var elieCalc = colt.addNumbers.bind(elie,1,2,3,4) // function(){}...
elieCalc() // Elie just calculated 10
```

```
// With bind - we do not need to know all the arguments up front!

var elieCalc2 = colt.addNumbers.bind(elie,1,2) // function(){}...
elieCalc(3,4) // Elie just calculated 10
```

Bind in the wild

Very commonly we lose the context of 'this', but in functions that we do not want to execute right away!

```
var colt = {
    firstName: "Colt",
    sayHi: function(){
        setTimeout(function(){
            console.log("Hi " + this.firstName)
        },1000)
    }
}
```

```
colt.sayHi() // Hi undefined (1000 milliseconds later)
```

Use bind to set the correct context of 'this'

```
var colt = {
    firstName: "Colt",
    sayHi: function(){
        setTimeout(function(){
            console.log("Hi " + this.firstName)
        }.bind(this),1000)
    }
}
```

```
colt.sayHi() // Hi Colt (1000 milliseconds later)
```

Creating an object

So how do we use our constructor to actually construct objects?

```
function House(bedrooms, bathrooms, numSqft){
    this.bedrooms = bedrooms;
    this.bathrooms = bathrooms;
    this.numSqft = numSqft;
}
```

```
var firstHouse = House(2,2,1000) // does this work?
firstHouse // undefined...guess not!
```

Why is this not working??

- We are not returning anything from the function so our House function returns undefined
- We are not explicitly binding the keyword 'this' or placing it inside a declared object. This means the value of the keyword 'this' will be the global object, which is not what we want!

The 'new' keyword

Our solution to the problem!

```
function House(bedrooms, bathrooms, numSqft){
    this.bedrooms = bedrooms;
    this.bathrooms = bathrooms;
    this.numSqft = numSqft;
}
```

```
var firstHouse = new House(2,2,1000)
firstHouse.bedrooms // 2
firstHouse.bathrooms // 2
firstHouse.numSqft // 1000
```

So what does the new keyword do? A lot more than we might think...

- It first creates an empty object
- It then sets the keyword 'this' to be that empty object
- It adds the line `return this` to the end of the function, which follows it
- It adds a property onto the empty object called "__proto__", which links the prototype property on the constructor function to the empty object (more on this later)

Using call/apply

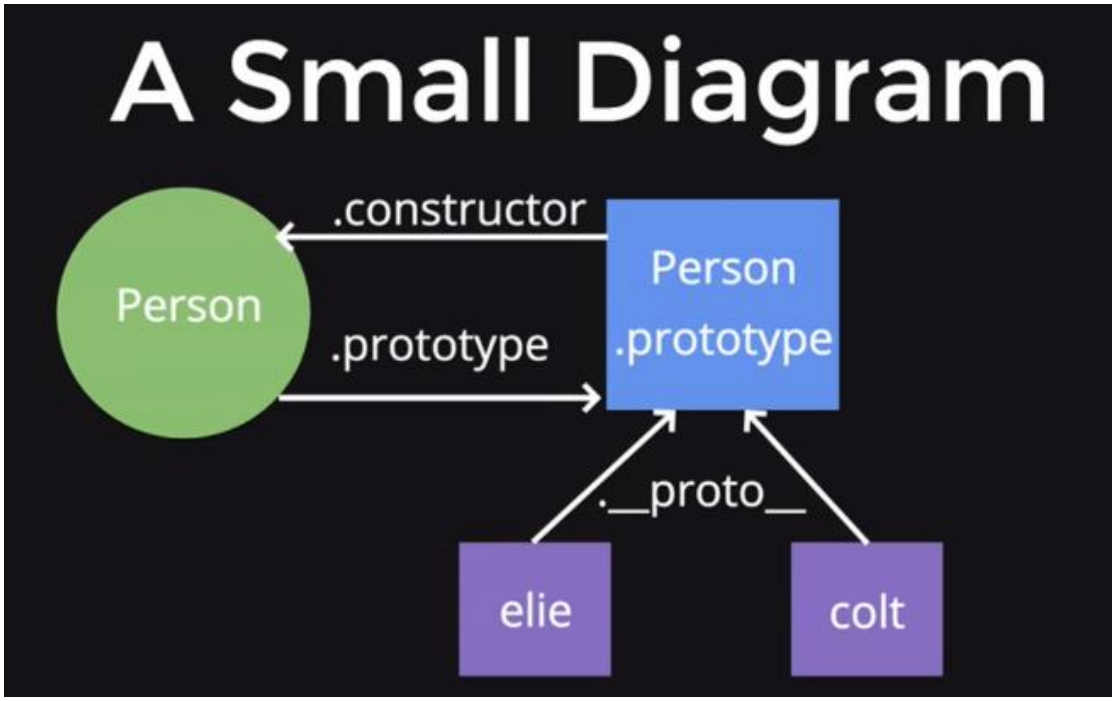
We can refactor our code quite a bit using call + apply

```
function Car(make, model, year){
    this.make = make;
    this.model = model;
    this.year = year;
    // we can also set properties on the keyword this
    // that are preset values
    this.numWheels = 4;
}
```

```
function Motorcycle(make, model, year){
    // using call
    Car.call(this, make, model, year)
    this.numWheels = 2;
}
```

```
function Motorcycle(make, model, year){
    // using apply
    Car.apply(this, [make,model,year]);
    this.numWheels = 2;
}
```

```
function Motorcycle(make, model, year){
    // even better using apply with arguments
    Car.apply(this, arguments);
    this.numWheels = 2;
}
```

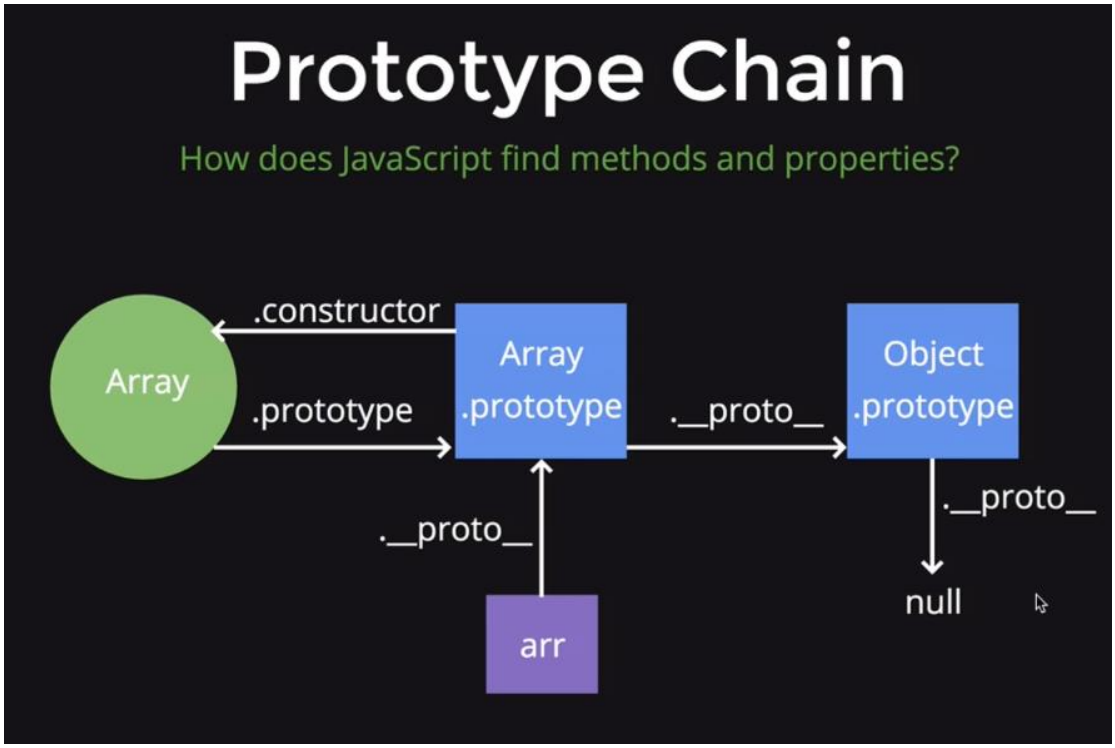


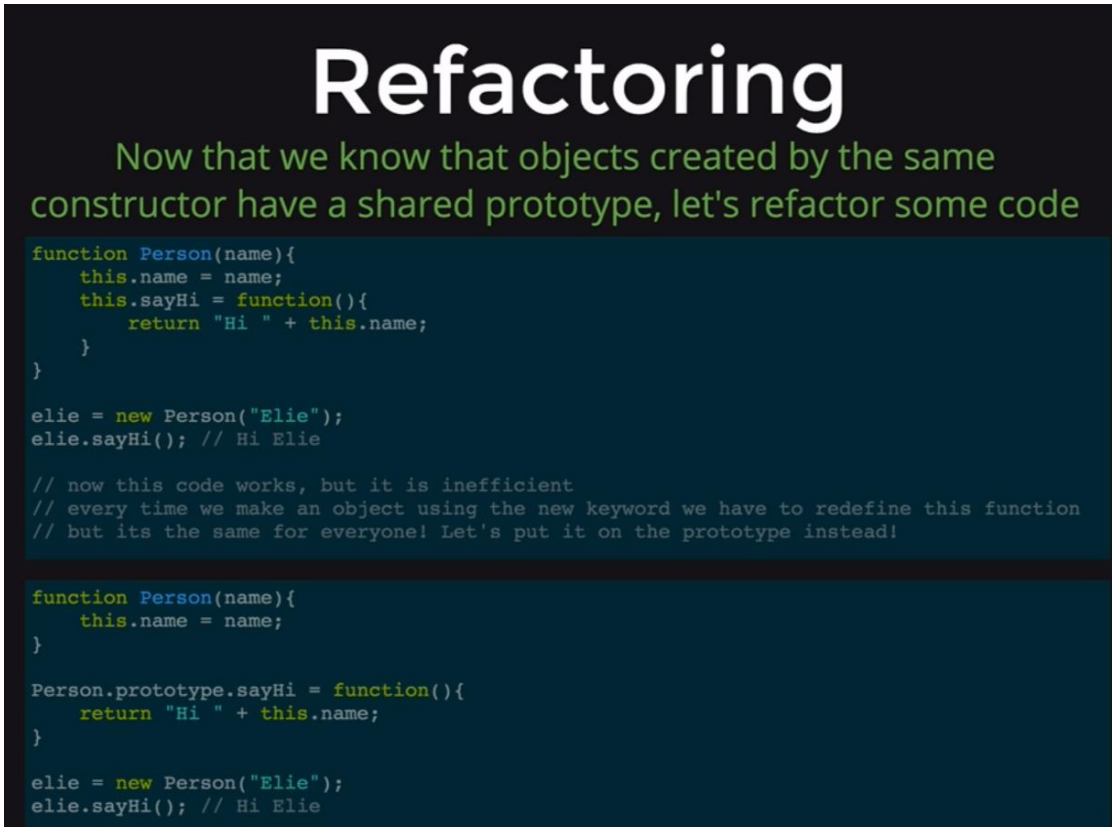
Code

Let's see that previous example in code - feel free to look back at the diagram

```
// this is the constructor function
function Person(name){
    this.name = name;
}

// this is an object created from the Person constructor

var elie = new Person("Elie");
var colt = new Person("Colt");

// since we used the new keyword, we have established
// a link between the object and the prototype property
// we can access that using __proto__

elie.__proto__ === Person.prototype; // true
colt.__proto__ === Person.prototype; // true

// The Person.prototype object also has a property
// called constructor which points back to the function

Person.prototype.constructor === Person; // true
```

```
All  Errors  Warnings  Info  Logs  Debug

> function Person(name){
      this.name = name;
  }
< undefined
> Person.prototype
< ▶ Object {}
> var elie = new Person("Elie");
  var colt = new Person("Colt");
< undefined
> elie.__proto__ === Person.prototype
< true
> Person.prototype.constructor
< function Person(name){
      this.name = name;
  }
>
```

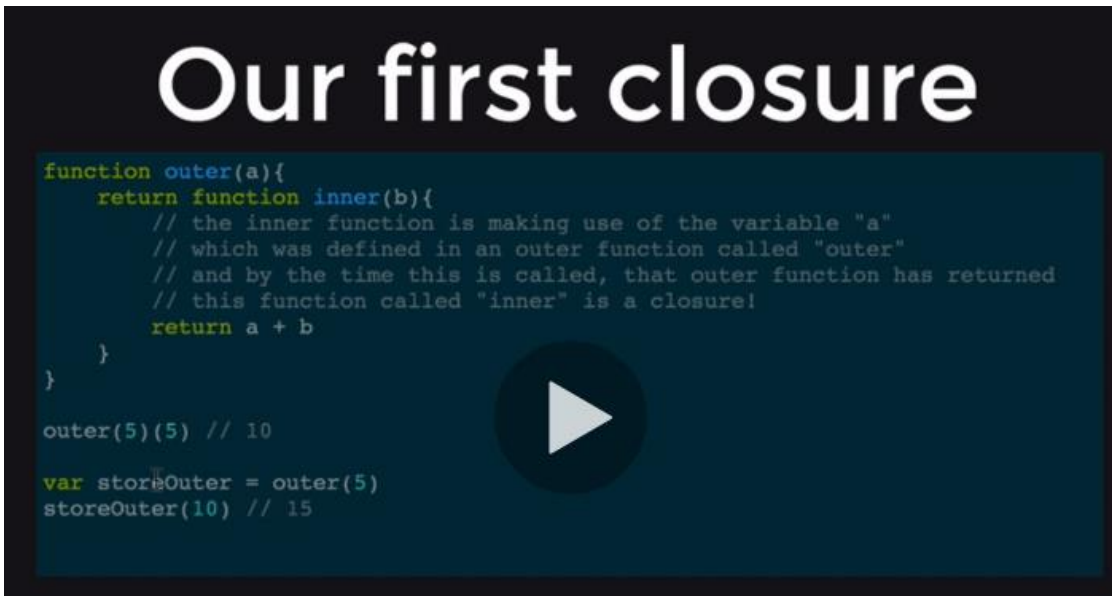




How to link a function to a object(js has not class)

```
function Vehicle(make, model, year){
    this.make = make;
    this.model = model;
    this.year = year;
    this.isRunning = false;
}
```

```
Vehicle.prototype.turnOn = function(){
    this.isRunning = true;
}

Vehicle.prototype.turnOff = function(){
    this.isRunning = false;
}

Vehicle.prototype.honk = function(){
    if(this.isRunning){
        return "beep!";
    }
}
```



Private Variables

In other languages, there exists support for variables that can not be modified externally, we call those private variables, but in JavaScript we don't have that built in. No worries - closures can help!

```
function counter(){
    var count = 0
    return function(){
        return ++count
    }
}

counter1 = counter()
counter1() // 1
counter1() // 2

counter2 = counter()
counter2() // 1
counter2() // 2

counter1() // 3 this is not affected by counter2!

count // ReferenceError: count is not defined - because it is private!
```

More Privacy

Let's look at this example:

```
function classRoom(){
    var instructors = ["Colt", "Elie"]
    return {
        getInstructors: function(){
            return instructors;
        },
        addInstructor: function(instructor){
            instructors.push(instructor);
            return instructors;
        }
    }
}

course1 = classRoom()
course1.getInstructors() // ["Elie", "Colt"]
course1.addInstructor("Ian") // ["Elie", "Colt","Ian"]
course1.getInstructors() // ["Elie", "Colt", "Ian"]

course2 = classRoom()
course2.getInstructors() // ["Elie", "Colt"] - not affected by course1

// we also have NO access to the instructors variable
// which makes it private - no one can modify it...you're stuck with Colt and Elie
```