Objects & Classes

Part 1

Plan for today

- What is an **object**?
- **Assignment**
- More than 1 thing with **vectors**
- Object **classes**

What do we *want*?

We *want* our data to look something like this...

name	height	mass	gender	homeworld	species
Luke Skywalker	172	77.0	male	Tatooine	Human
C-3PO	167	75.0	NA	Tatooine	Droid
R2-D2	96	32.0	NA	Naboo	Droid
Darth Vader	202	136.0	male	Tatooine	Human
Leia Organa	150	49.0	female	Alderaan	Human
Obi-Wan Kenobi	182	77.0	male	Stewjon	Human
Chewbacca	228	112.0	male	Kashyyyk	Wookiee
Han Solo	180	80.0	male	Corellia	Human
Yoda	66	17.0	male	NA	Yoda's species
Boba Fett	183	78.2	male	Kamino	Human

What do we *want*?

What R sees...

```
## # A tibble: 10 x 6
##    name           height  mass gender homeworld species
##    <chr>           <int> <dbl> <chr>  <chr>     <fct>
##  1 Luke Skywalker    172  77   male   Tatooine  Human
##  2 C-3PO             167  75   <NA>   Tatooine  Droid
##  3 R2-D2              96  32   <NA>   Naboo     Droid
##  4 Darth Vader       202 136   male   Tatooine  Human
##  5 Leia Organa       150  49   female Alderaan  Human
##  6 Obi-Wan Kenobi    182  77   male   Stewjon   Human
##  7 Chewbacca         228 112   male   Kashyyyk  Wookiee
##  8 Han Solo          180  80   male   Corellia  Human
##  9 Yoda               66  17   male   <NA>      Yoda's species
## 10 Boba Fett         183  78.2 male   Kamino    Human
```

How do we get there?

Objects

- A basic concept in (statistical) programming is called an **object**
- An **object** allows you to store a value or a thing:

An object can be...

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Important:

- Objects have *names*
- We are going to refer to objects by their *names*
- Since they have names, we can **store** objects and use them later

Storing data in objects

If you want to use an object later on (you do!), you have to name it.

This is called **assignment** or **assigning** a name to an object

In takes the form of:

```
nameOfMyObject <- objectToStore
```

Go do Practice #1

When you have finished, come back here.

What's the point of storing objects?

Remembering things sucks! Let R hold on to all the stuff you don't want to remember or write down right away.

Let's do an example with a series of math equations:

$$y = 17 * 8$$

$$z = \frac{y}{3}$$

How do we solve this?:

1. Solve for y, which is 136. Either remember 136 or write the number down.
2. Plug it in in the second equation, so that you have 136 divided by 3.

Let's do this with R code!

Let's do an example with a series of math equations:

$$y = 17 * 8$$

$$z = \frac{y}{3}$$

With code:

```
y <- 17*8 # first, solve for y
z <- y/3 # now, solve for z
```

We didn't even need to know that `17*8` is `136`. We stored the value of `136` as an object with the name `y`.

Then, we could tell R to simply use the name `y` anytime we wanted to refer to the number `136`

Who cares?

Remembering a single number seems a little ridiculous. But remember, an object in R can really be anything. Some objects you definitely might want to store for later:

- A data set like `empire`
- A correlation coefficient
- The output of a linear regression model
- p-values and other statistics
- The mean of a variable, so you can subtract the mean from every individual's score
- and lots, lots more!

If you do not assign a name to an object, R will not remember it!

Example:

```
17*8
```

```
## [1] 136
```

```
y/3
```

```
## Error in eval(expr, envir, enclos): object 'y' not found
```

The error message `object 'y' not found` is very common!

R cannot perform the operation because you never told it to remember `17*8`

Go do Practice #2

When you have finished, come back here.

One type of object: Vectors

A group of objects is called a **vector**

Vectors are *ONE-DIMENSIONAL*. You can think of this as either a row...

name	height	mass	gender	homeworld	species
Luke Skywalker	172	77	male	Tatooine	Human
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One type of object: Vectors

A group of objects is called a **vector**

Vectors are *ONE-DIMENSIONAL*. You can think of this as either a row... ... or a column

name	height	mass	gender	homeworld	species
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Making Vectors

In your R code, you will type `c()` in order to create a vector

The `c` stands for *"combine"* or *"concatenate"*

Some examples:

```
subjectID <- c("Subject 1", "Subject 2", "Subject 3", "Subject 4", "Subj
passedStats <- c(TRUE, FALSE, FALSE, TRUE, TRUE)
favoriteNumbers <- c(7, 3, 6, 10, 100)
countries <- c(0, 3, 10, 1, 8)
```

Vectors

Because these items are grouped together, you can do something to them all at once!

Let's say these 5 people all went on a trip together, and they visited 2 countries. We can add `2` to the entire vector, rather than each individual number:

```
countries + 2
```

```
## [1]  2  5 12  3 10
```

Go do Practice #3

When you have finished, come back here.

Basic object classes

Objects can be of a different `class`. You can think of it more as *what type of information is stored in the object?*. Some of the options are:

- **Numeric:** Decimals (3.141593)
- **Integer:** Natural numbers (0,1,2, etc.)
- **Character:** Text or string characters:
  - Always inside quotation marks
  - **Factors** (or categories)
- **Logical:** True or False:
  - No quotations
  - 2 possible values: `TRUE` or `FALSE`
- **Missing Value:** `NA`