Intro to Programming with R for Political Scientists

Session 2: Base R and Tidyverse Basics

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2021-06-05

Overview

1. **Intro**
2. **R-Studio and (Git)Hub**
3. **Base R & Tidyverse Basics**
4. **Data Wrangling I**
5. **Data Wrangling II**
6. **Data Viz**
7. **Writing Functions**
8. **A complete scientific workflow with R**

Trivia

- R was designed in 1993 by Ross Ihaka and Robert Gentleman
- Builds upon the S programming language by John Chambers
    - Named R as a play on S and bc of the first names of the authors
- There are 17656 packages available on **CRAN** as of 2021-06-05.
- **R-Studio** $\neq$ **R-Core Team**; the former is a mix of a for-profit and a non-profit company; highly committed to produce free & open-source products; has some business solutions

Image source and more R-History trivia

CalculatoR

CalculatoR

```
7+5 # [n] stands for the nth element printed to the console.
```

```
## [1] 12
```

```
4*5+2/3^3 # Multiplication and division first, then addition and subtraction
```

```
## [1] 20.07407
```

```
# Modulo Operators:

10 %/% 3 # Integer division
```

```
## [1] 3
```

```
10 %% 3 # Remainder ("Rest")
```

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

CalculatoR

```
# Relational and logical operators

3 < 4
```

```
## [1] TRUE
```

```
2 == 1 & 4 > 2  # == "equal to"; & "element wise logical AND"
```

```
## [1] FALSE
```

```
2 == 1 | 4 > 2 # | "element wise logical or"
```

```
## [1] TRUE
```

```
3 != 4 # != "not equal"
```

```
## [1] TRUE
```

CalculatoR

```
# Floating Points

0.1 + 0.2
```

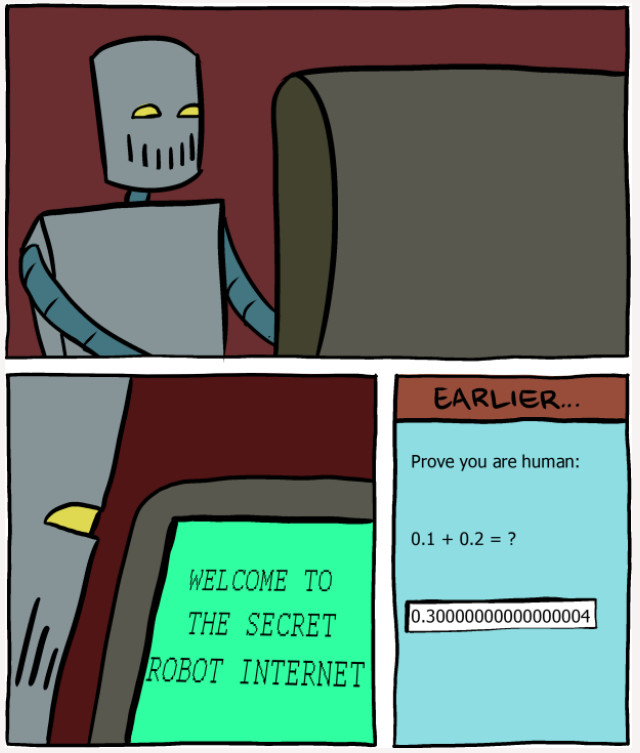
```
## [1] 0.3
```

```
0.1 + 0.2 == 0.3
```

```
## [1] FALSE
```

Why?!

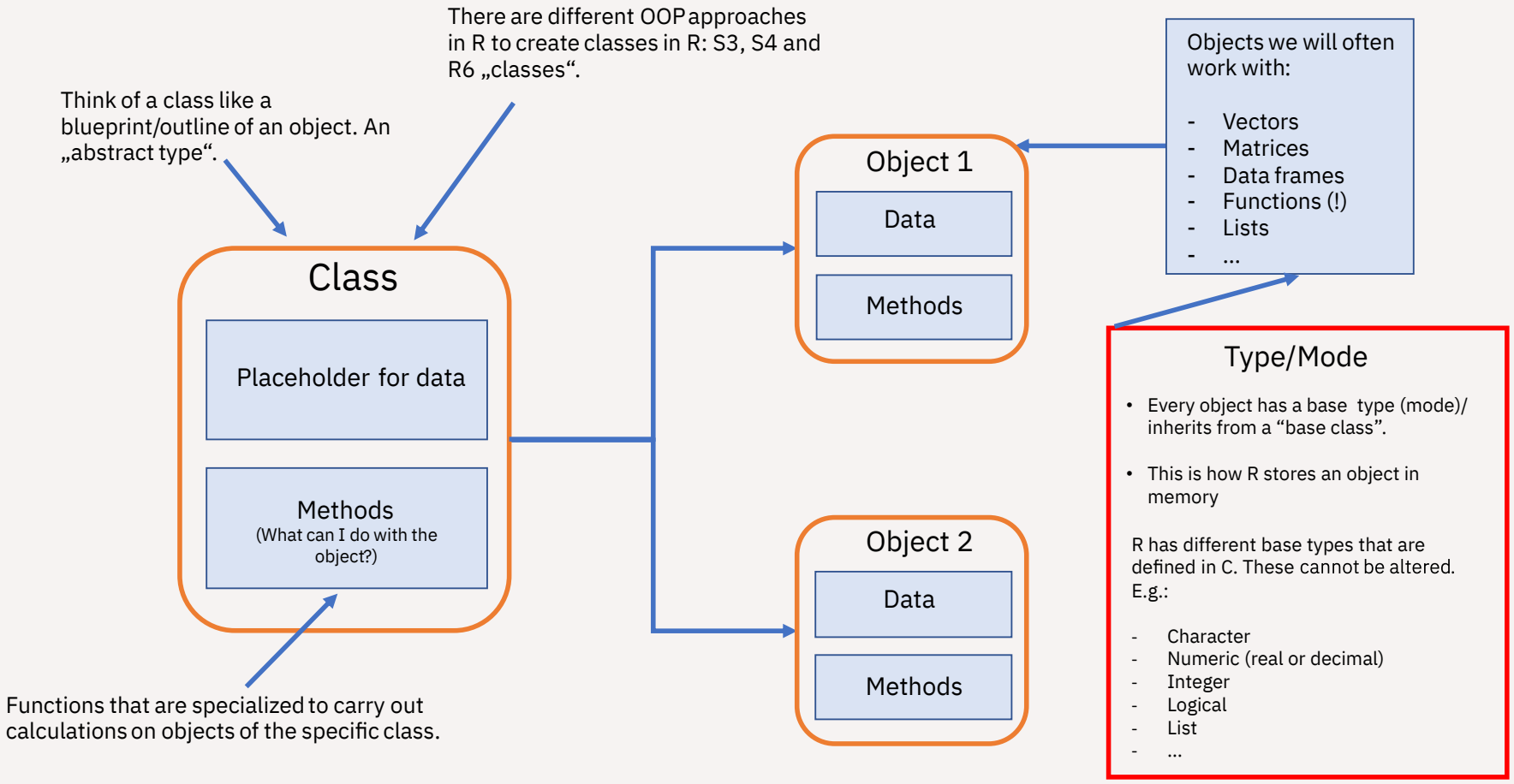
> **Because internally, computers use a format (binary floating-point) that cannot accurately represent a number like 0.1, 0.2 or 0.3 at all.**



A Primer on OOP ("Object Oriented Programming")

Object Oriented Programming

> Everything is an object and everything has a name.



Functions

Making Objects: Assignment

- You can use `<-` or `=` for assignment
- For instance,

```
a <- 3 # Or a = 3
```

assigns the name `x` to an object of type/mode numeric. I.e. binds an object to a name.

Simplification:

> creates an object named ‘a’,
> containing the value 3.

-Using

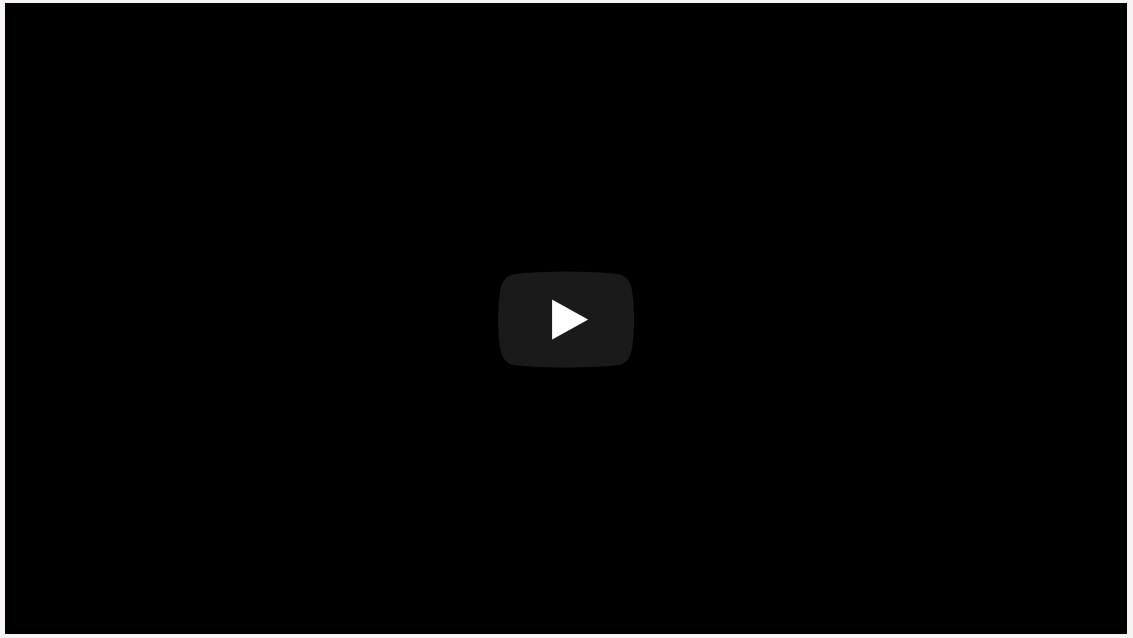
```
class(a)
typeof(a)
```

gives you information about the class/type of the object. `class()` gives the class of the object from an OOP POV, `typeof()` the base type.

- In this case, both yield the same results:

Making Objects: Assignment

- Using `=` is legal as per the man, the myth, the legend Ross Ihaka himself:



Naming Conventions

Workspace & Environment

- In contrast to Stata, R can hold multiple

Vectors

Matrices

Lists

Factors

Data Frames

Some Indexing Basics

Loading Packages

The Tidyverse

The Tidyverse

Summary