## Common errors and how to fix them

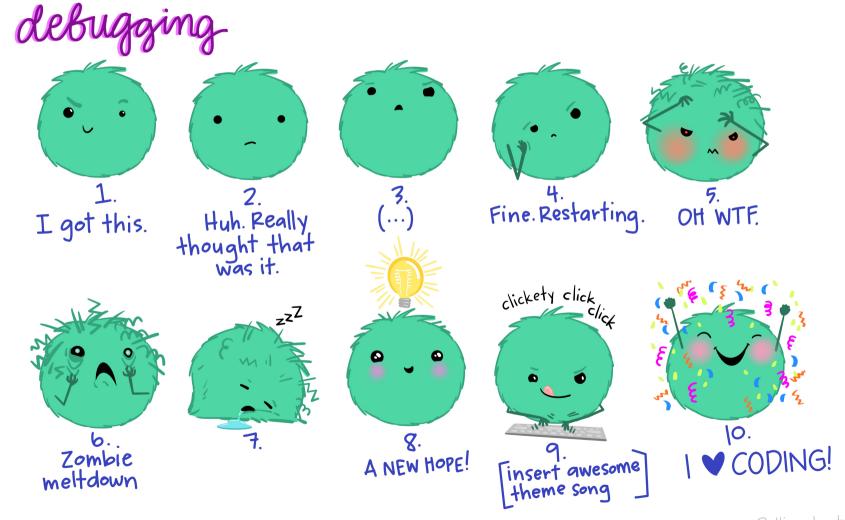
Introduction to R - Day 1

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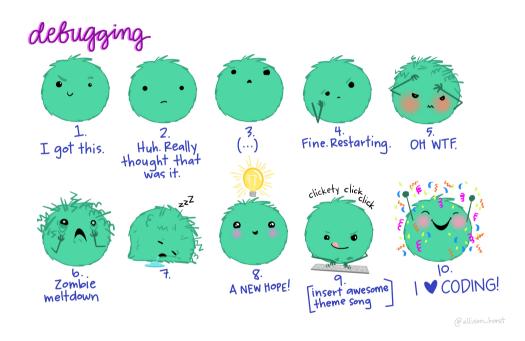
When learning a programming language, you have to be prepared to spend a lot of your time with fixing bugs in the code. So don't worry: It's not you, it's just how programming works!



## Debugging

Debugging can be annoying and we can't avoid it, but ...

- ... it's an **effective learning experience** (I actually learned the most from debugging my code)
- ... it will get easier over time
- ... there are some **debugging techniques** to decrease the time in stages 2-7
- ... if nothing helps, there are great people all over the internet willing to help



# Most common Reference and problems for beginners and how to deal with them

## Syntax errors

#### Example

#### How to fix

- look for missing commas, misspelled arguments, ...
- read the error message
- the RStudio syntax checker warns you before you run code with syntax errors
  - look for next to line numbers in your script

```
307
308 mean(c(1,2,3)na.rm=TRUE)
309 expected ',' after expression expected whitespace around '=' operator
```

### Error: could not find function

#### Examples

```
## b a
## 1 1 1
## 2 2 2
## 3 3 3
## 4 4 4 4
## 5 5 5
## 6 6 6
## 7 7 7
## 8 8 8
## 9 9 9
## 10 10 10

## Error in lenght(1:10): could not find function "lenght"
```

#### How to fix

Could not find function errors have two main reasons:

1. You forgot to load the package that the function belongs to

## Error: object x not found

#### Example

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

#### How to fix

- you are trying to access an object that does not exist
- Mostly because:
  - o typos in variable name (variable name is variable A but you try to access variable A)
  - o forgot to put quotes around string: print (hello) → looks for a variable named hello but instead you wanted to print the string print ("hello")

## Wrong data format

#### Example

- does not necessarily trigger an error message
- if there is an error message, it can also appear later in your code

#### How to fix it

- Look at str() of your data and check whether all columns are there and in correct format
  - e.g. is a column of type character but should be of type integer?
- Do that at multiple locations in your script to find the line where the error actually happens
  - everytime you change something in your data, check its structure

## R crashes

Sometimes R crashes completely and you see this:



#### How to fix it

- There is no fix but to start a new session
- Make sure to save your scripts regularly!

## Console prints +

R is not running code anymore and the console only prints + if you try to execute a command.

#### How to fix it

- First, go to the console and hit Escape. Then you should see the > sign instead of + again.
- Likely you forgot to close a bracket somewhere. Go to your script and check where this happened
  - look for next to line numers

## Warnings

R can give you warnings for many reasons, e.g.

- you have NA values in your data and try to plot them
- implicit type conversion returned NA
- the function you are using is deprecated
- the package you are using was built for another version of R

Warnings are no errors and can sometimes be ignored but:

- make sure to read and understand warnings
- only ignore them if you know that that's okay, otherwise fix the underlying issue

# How to troubleshoot R code

A step by step guide

## Troubleshoot R: Step by step

Often, you don't need to do all the steps but a systemmatic approach to bug fixing is very helpful.

Step 1: Carefully read the error message and try to fix it

Step 2: Is it any of the errors you learned about just now?

Step 3: If the error is about data or other variables: look at the structure using str()

**Step 4**: If the error is about a function: Read the documentation using ?functionName.

- Did you use the function correctly?
- Did you forget an argument?

Step 5: Look for answers online

often you can also jump directly to this step

Step 6: Ask others for help

## Step 5: Look for answers online

- Search with keywords R + package name + Error message/Warning
- If you don't know how do do something try searching R + package name + What you want to do, e.g.
  - "R ggplot change axis title"
  - "R sort vector"
- Usually you can pick any of the top search results, but I recommend results from Stack Overflow
- Always search in English to get more results
- Change language of R messages to English with Sys.setenv(LANGUAGE='en')

## Step 6: Ask others for help

There are plenty of places where you can ask for help online. Some common and good options are:

- Ask a question on Stack Overflow
- Ask in the R Discord server
  - usually fast answers
  - but: you need a Discord account
- Ask on Twitter using the #rstats hashtag (maybe a bit less common)

But: You have to make sure that before, you tried all the other 5 steps.

To ask questions online, you have to learn how to ask a good R question. This includes:

- clear question
- reproducible example

Look here for more info on how to ask a good question about R