

Data Analysis in Biology

BIO144

Prof. Owen Petchey

Dr Stefanie Muff

Teaching Assistants

You All



TED

LOG IN



Arthur Benjamin:

Teach statistics before calculus!



The “**hottest skill**”
that got people
hired in 2014?

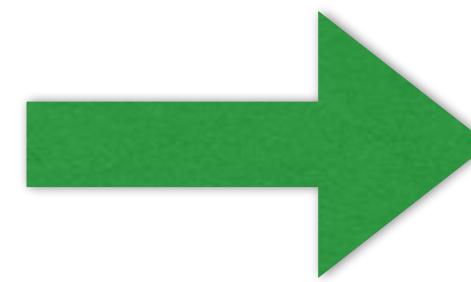
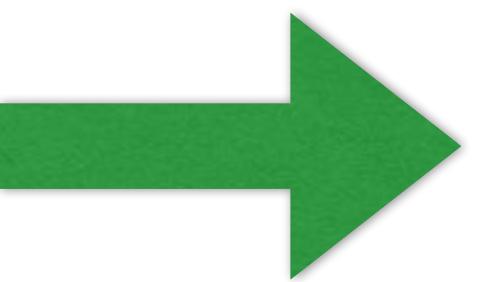
Statistical Analysis



0:06 / 3:00

Source: LinkedIn

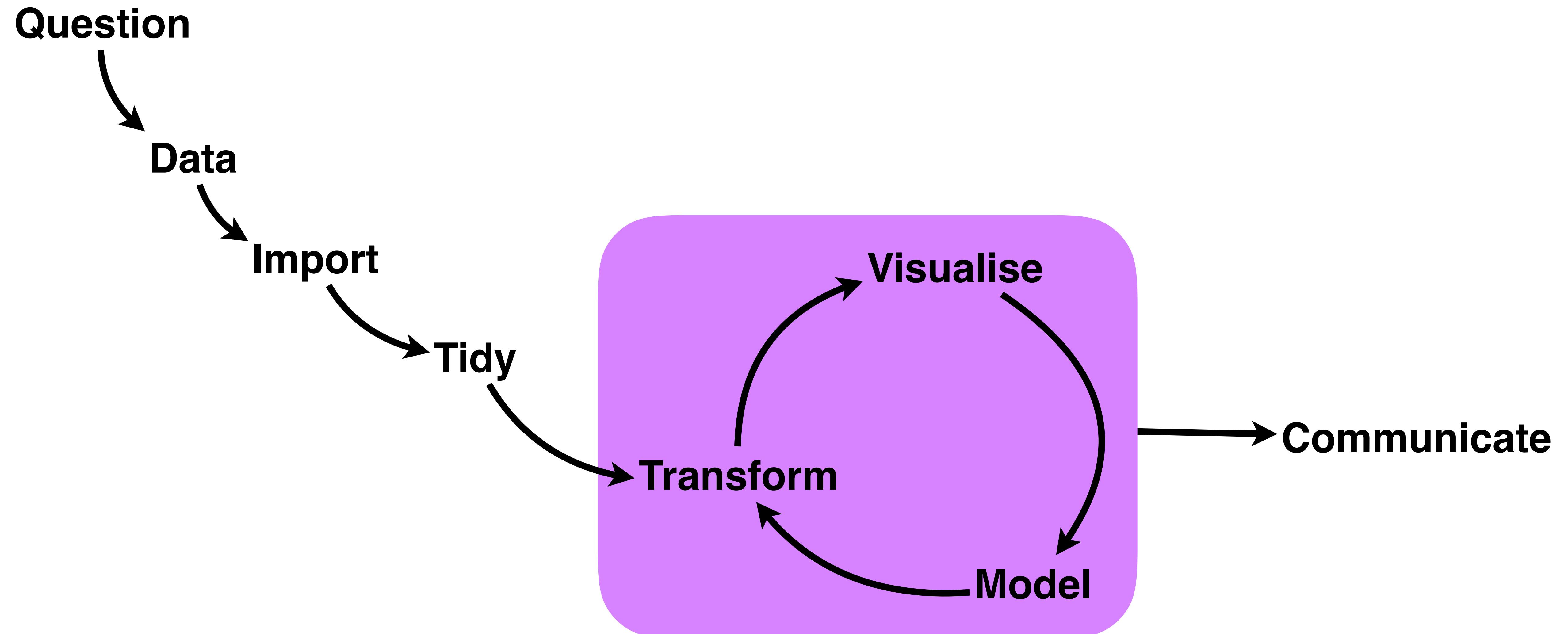




Question
Puzzle
Problem

Data
+
Analysis

Answer
Solution

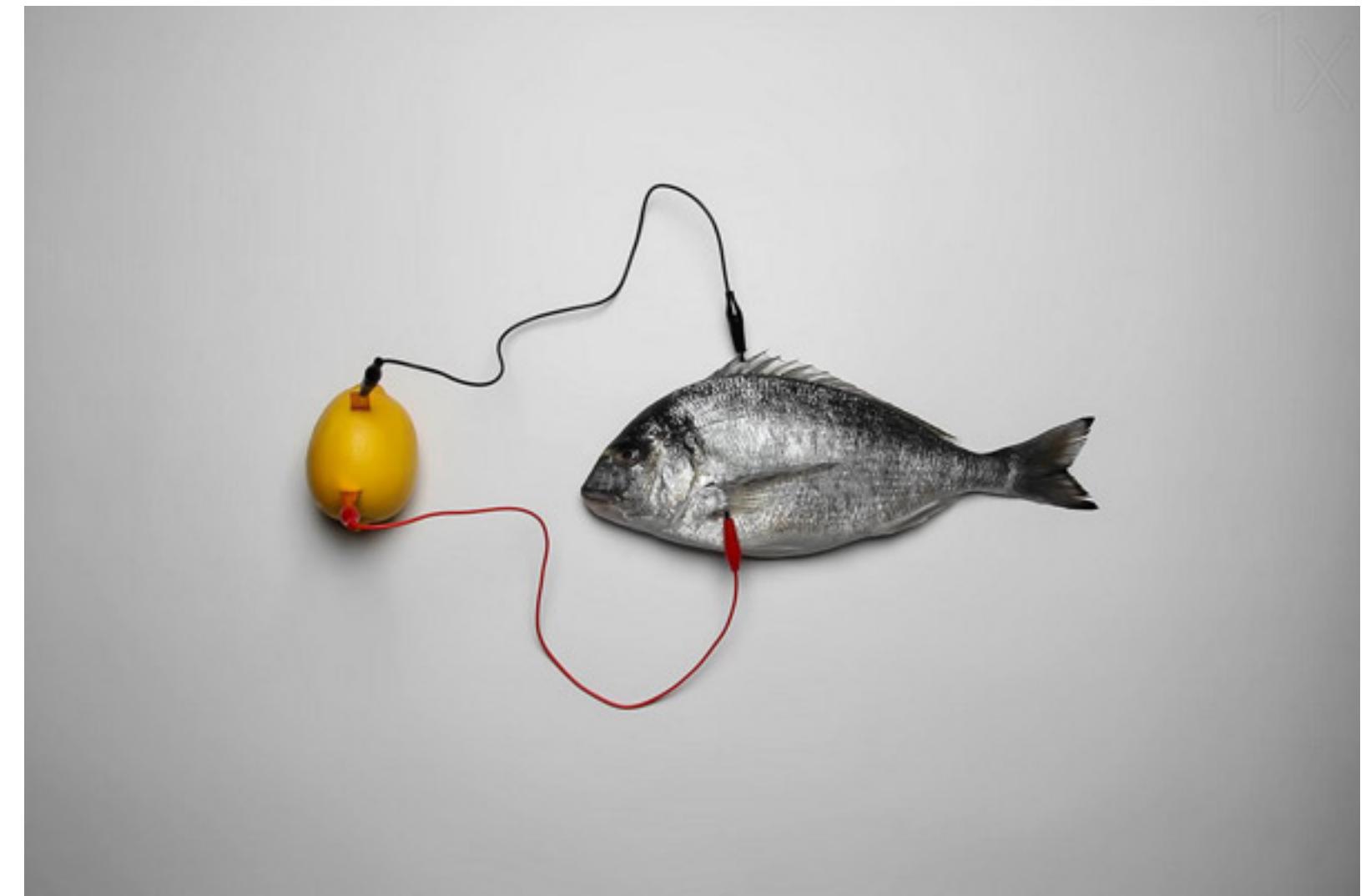


Efficient
Consistent
Repeatable
Reliable
Readable
Robust
Persistent
Sharable
Scalable

—
—



The conceptual side



3 - 5pm

The practical side



1 - 3pm

<https://openedx.mnf.uzh.ch>

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Chemie
Geographie

University of Zurich

WELCOME TO OPENEDX @ UZH!

Mathematik

Biologie

UZH
BIO144
DATA ANALYSIS IN BIOLOGY

Starts: Jul 27, 2016

UZH
BIO134
PROGRAMMING IN BIOLOGY

Starts: Sep 01, 2016

UZH
MULTI_MODULE
INTRODUCTION TO R

Starts: Sep 11, 2016

UZH
AST241
INTRODUCTION TO ASTROPHYSICS

Starts: Sep 12, 2016

UZH
EE-101
What is the equivalent resistance between the two marked nodes?

UZH
BIOL101
Cell Biology

UZH
BIOL102
Ecology

The details



Are all on openedX@MNF

Learning objectives

Schedule

Weekly structure / activities

Assessment

Getting help

Giving feedback

Attendance

Email and matriculation number



switch

Live data analysis demonstration

BIO144
Week 1

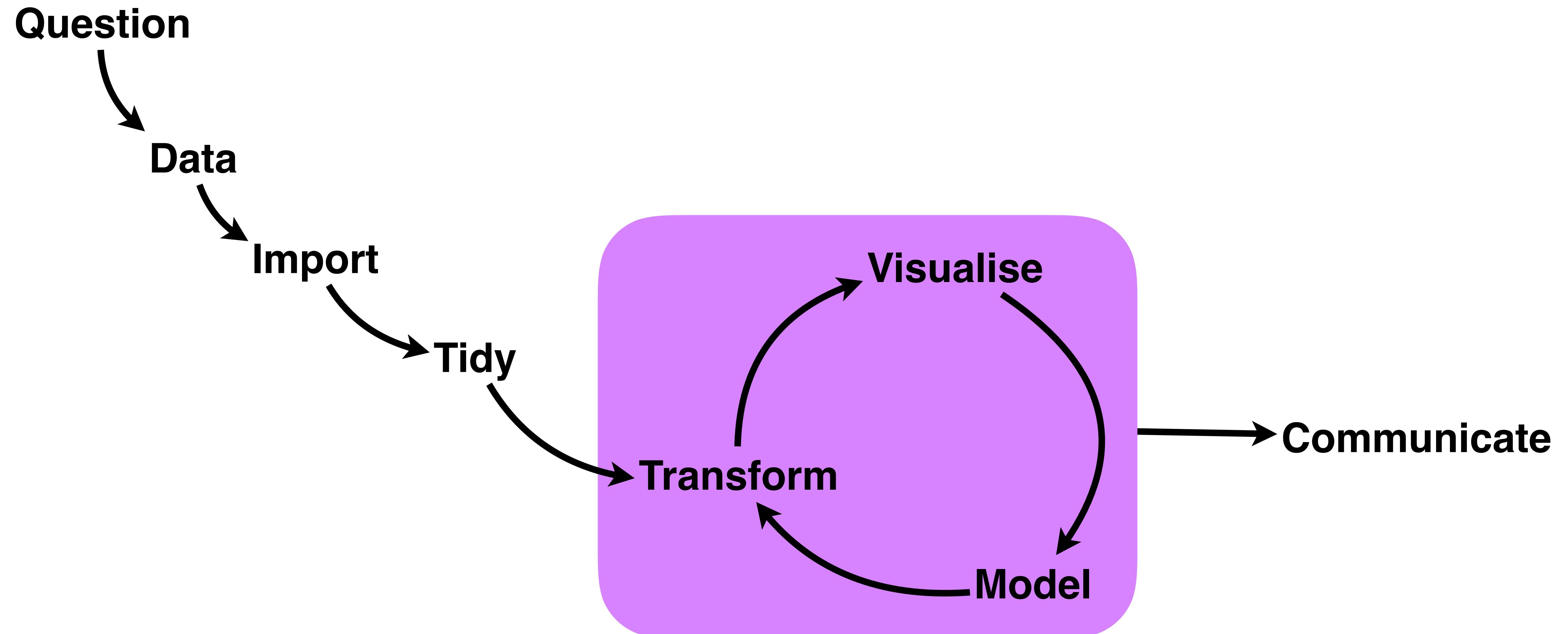
Its a demonstration...

The idea is to give you a feel of what is involved in data analysis.

You will understand some of the demonstration.

You will not understand some of it.

Keep notes about what you don't understand.



Live data analysis demonstration

The whole data analysis workflow in one hour!!!

Question

Expectation

Planned presentation & analysis

Selection of subjects

How will data be collected?

Ethics / permissions

Data collection

Data wrangling

Visualise

Statistical test

Critical thinking

Report / communicate

The question

- What should be our question?
- As always, there are some influences and some constraints.
- We should ask a question of interest to us, and of some importance.
- And we should be able to collect the data, within our current constraints, necessary to answer the question.
- The question we will address is "***do male and female reaction times of students at the University of Zurich differ?***".
- Why this question? Reaction times are important, safety, sport...

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Expectation

- Quite a lot of work on this already.
- Generally, males tend to have faster reaction times than females. So we expect that to be the same for students at the University of Zurich.
- Given that you know this pattern, and you are the subjects, its interesting to see if you women can buck the trend, perhaps by trying especially hard. Though know the men know you might do this, it probably won't work!

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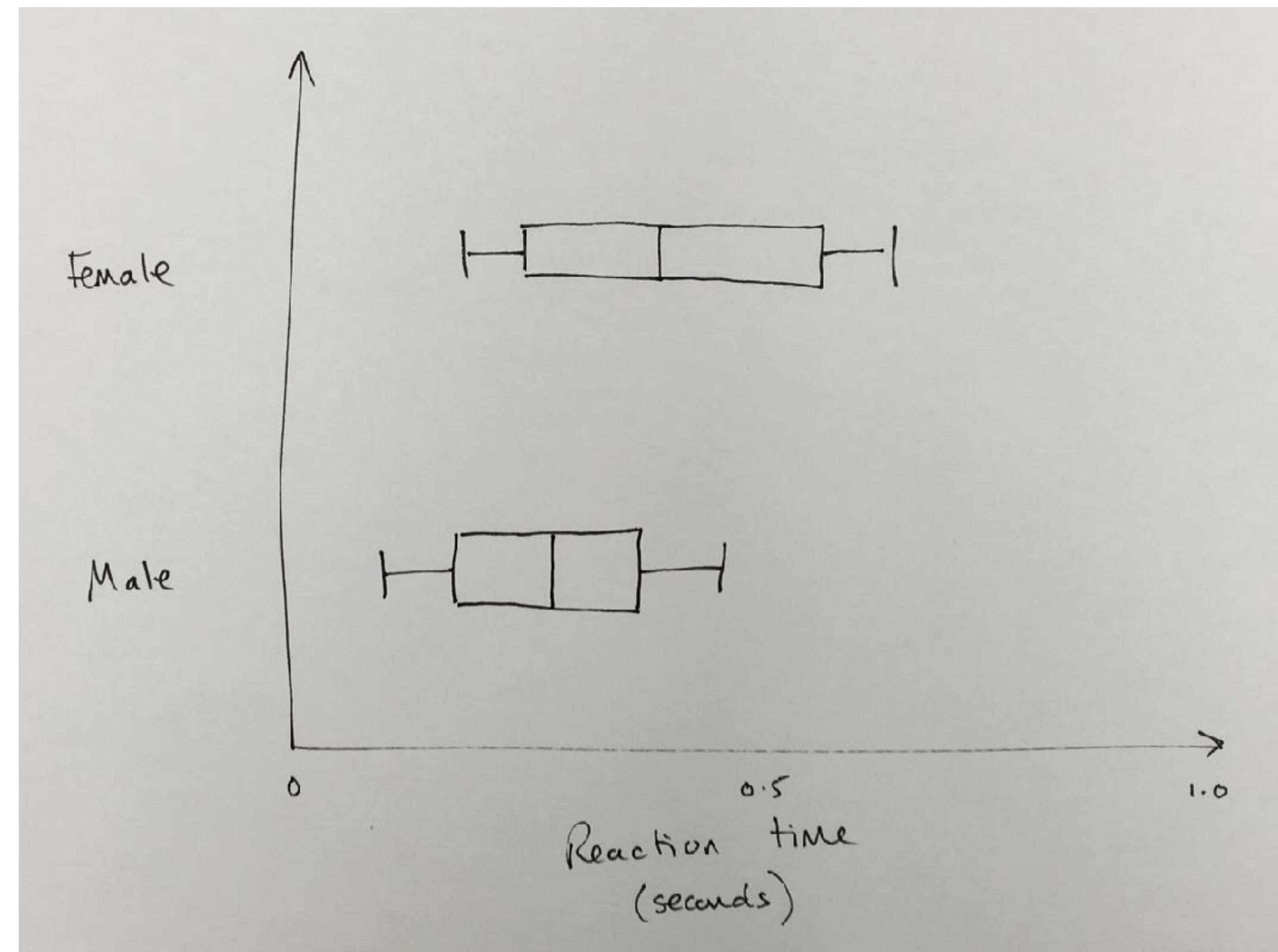
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What statistical test?

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Make up a unique ID code for yourself.
It should not be anything that could identify you.
Keep it safe.

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The screenshot shows the homepage of humanbenchmark.com. At the top, there is a navigation bar with links to various services like FRT, ERC app, ScribblePost, Hyp, PUI, rOpenSci, GG, feedly, Iris, MI, Github, I2R, DE, MM, Scopus, WoS, GS, EMEH, TTL, RSeek, UZH WM, Altmet, OLAT+, phd funding, Work, and pers. Below the navigation bar, there are three main buttons: HUMAN BENCHMARK, DASHBOARD, and GAMES. A sign-up button is also present. The main content area features a large green background image of a leaf. In the center, there is a yellow lightning bolt icon and the text "How powerful is your brain?". Below this, it says "Use our targeted tests to find out for free." and a "GET STARTED" button. At the bottom, there is a white box containing four memory tests: Number Memory (red circle with 123), Reaction Time (yellow circle with lightning bolt), Verbal Memory (green circle with book), and Visual Memory (blue circle with grid). Each test has a brief description below it.

This screenshot shows the same Human Benchmark homepage as above, but focusing on the "GAMES" section. It displays four memory tests: Number Memory, Reaction Time, Verbal Memory, and Visual Memory, each with its own icon and description. At the bottom right, there is copyright information: "Copyright 2007-2016 Human Benchmark", "contact@humanbenchmark.com", and "Licensing".

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<http://bit.ly/2gnXxfo>

The screenshot shows a Google Forms survey titled "My Human Benchmark results". The survey is for a live data analysis demonstration, BIO144, Data Analysis in Biology. It contains the following questions:

- Please enter the unique ID code you gave yourself.** (Required)
Your answer: _____
- What is your gender?** (Required)
 - Female
 - Male
 - Other: _____
- Please enter your average reaction time in seconds (e.g., 0.326).** (Required)
Your answer: _____
- Please enter your score on the Verbal Memory test.** (Required)
Your answer: _____
- Please enter your score on the Number Memory test**
Your answer: _____

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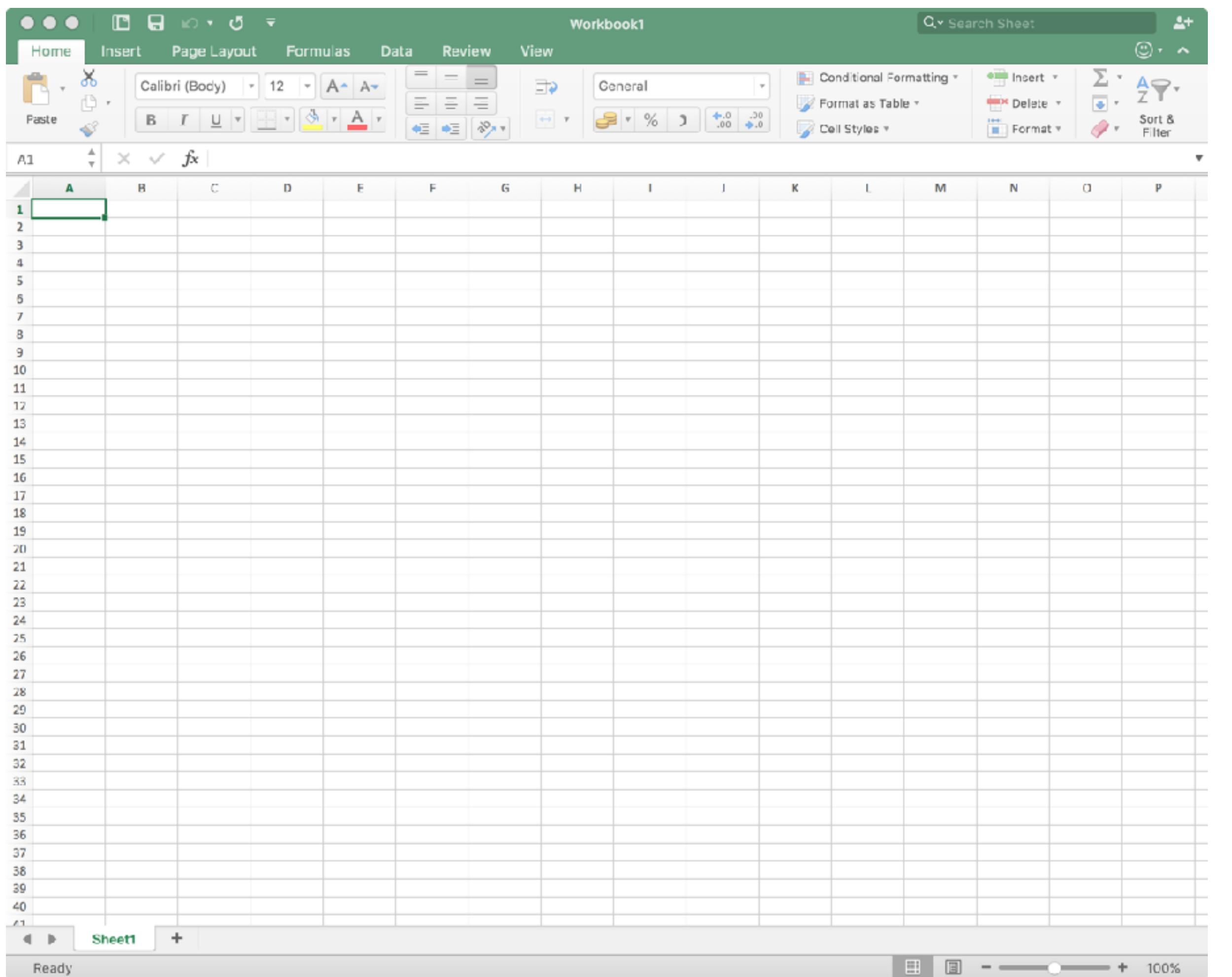
- Data wrangling
- Visualise
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Check the data in the spreadsheet

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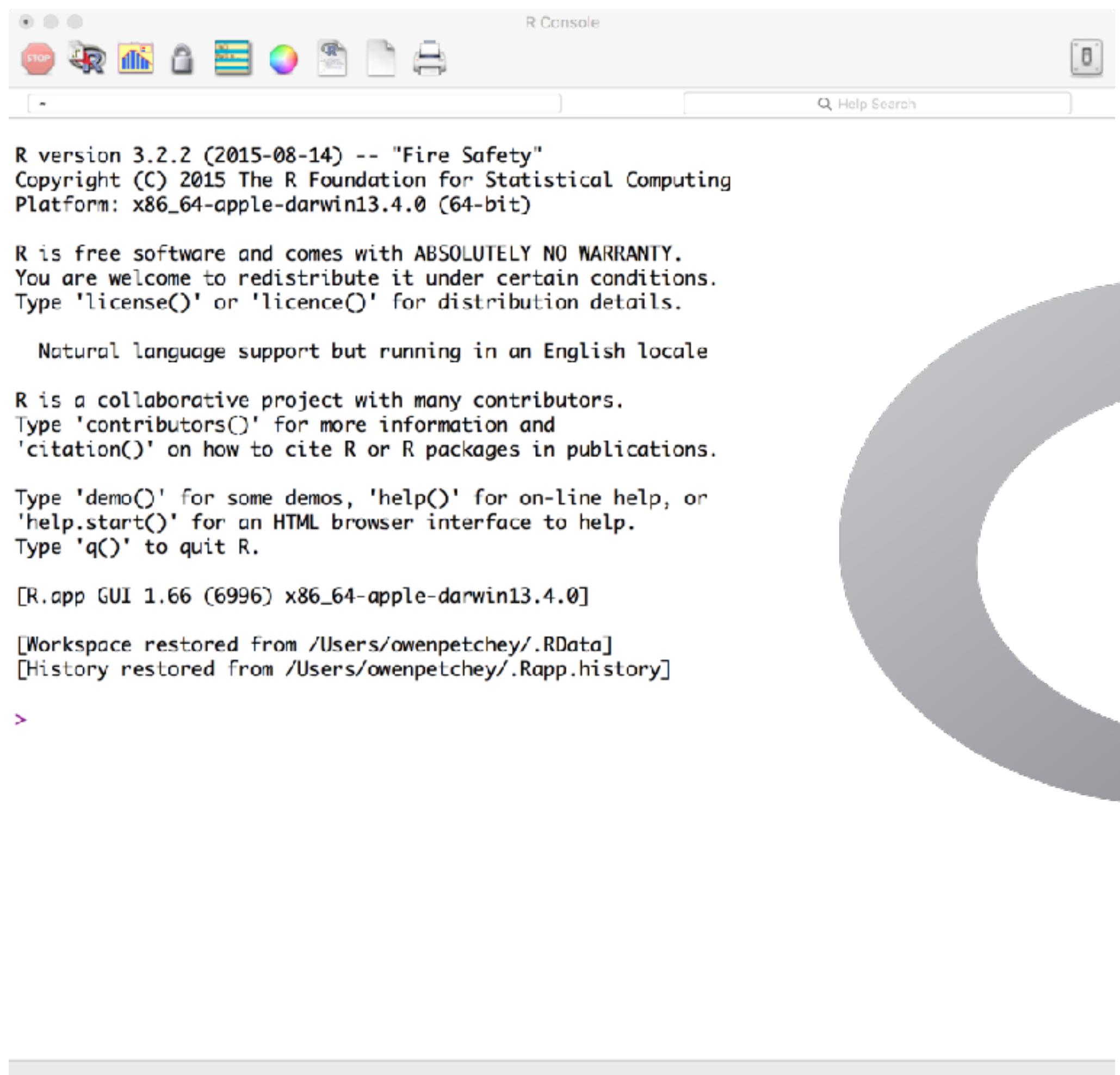
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Live in RStudio

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