

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?

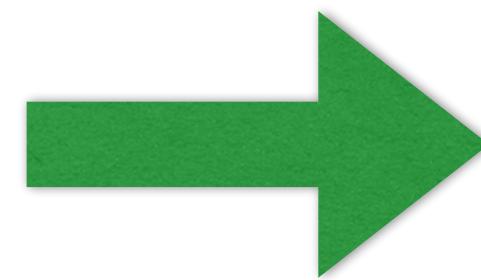
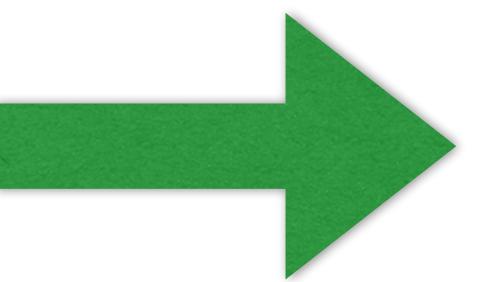
Statistical Analysis

Source: LinkedIn



0:06 / 3:00

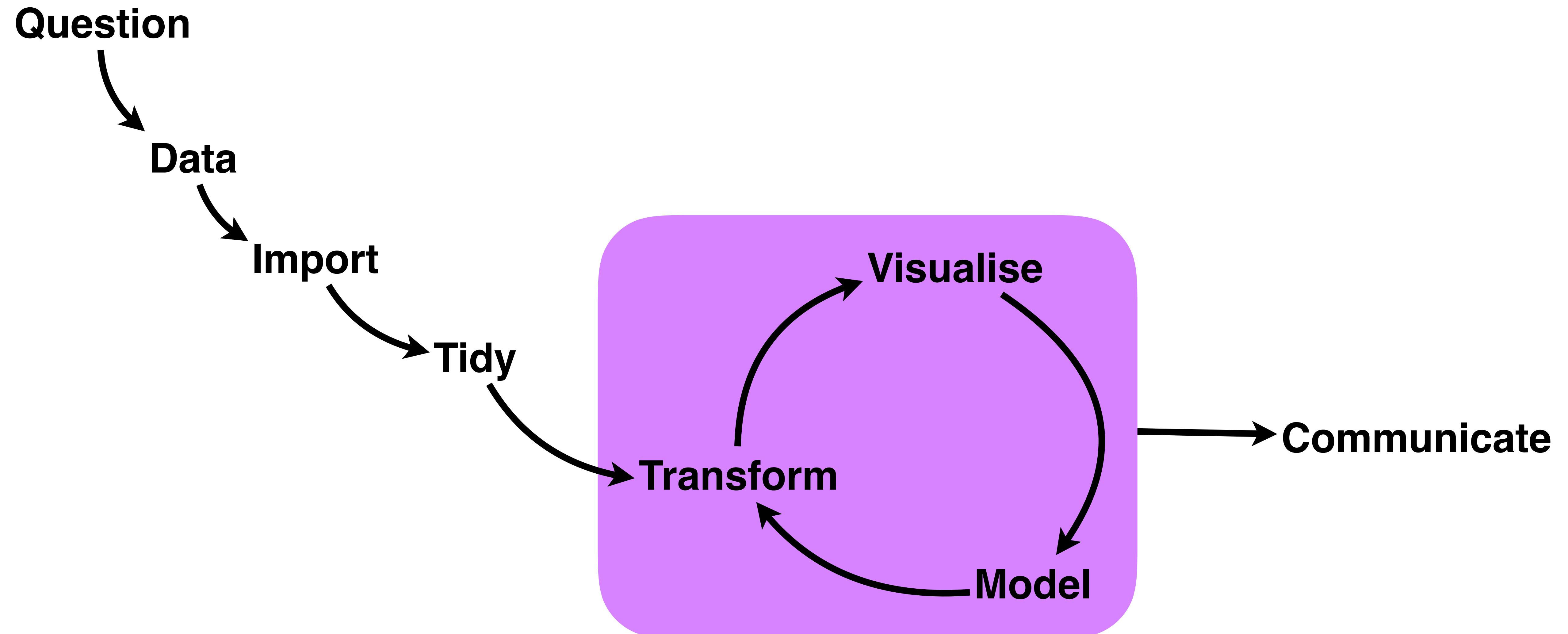




Question
Puzzle
Problem

Data
+
Analysis

Answer
Solution

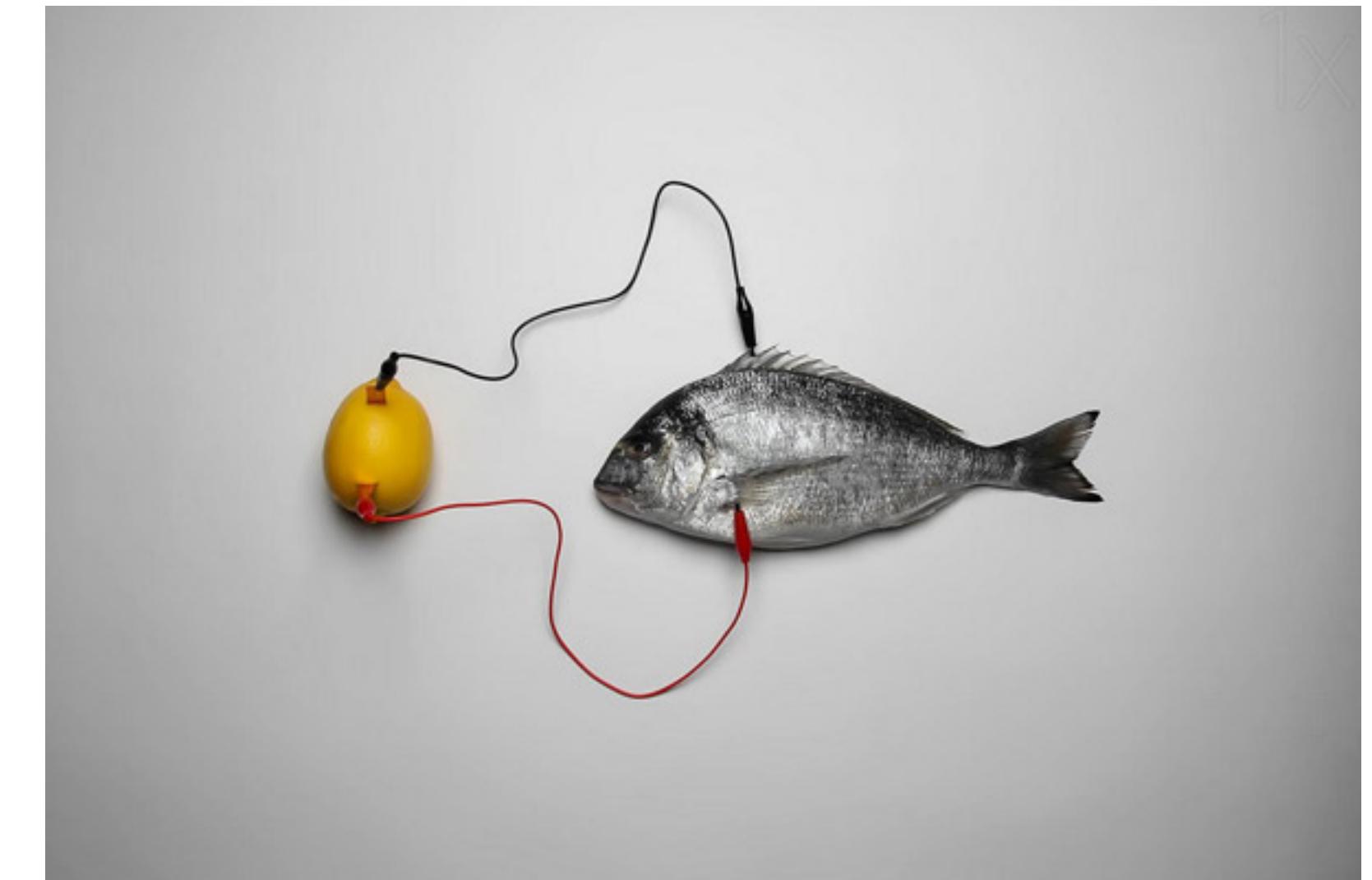


Efficient
Consistent
Repeatable
Reliable
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Sharable
Scalable

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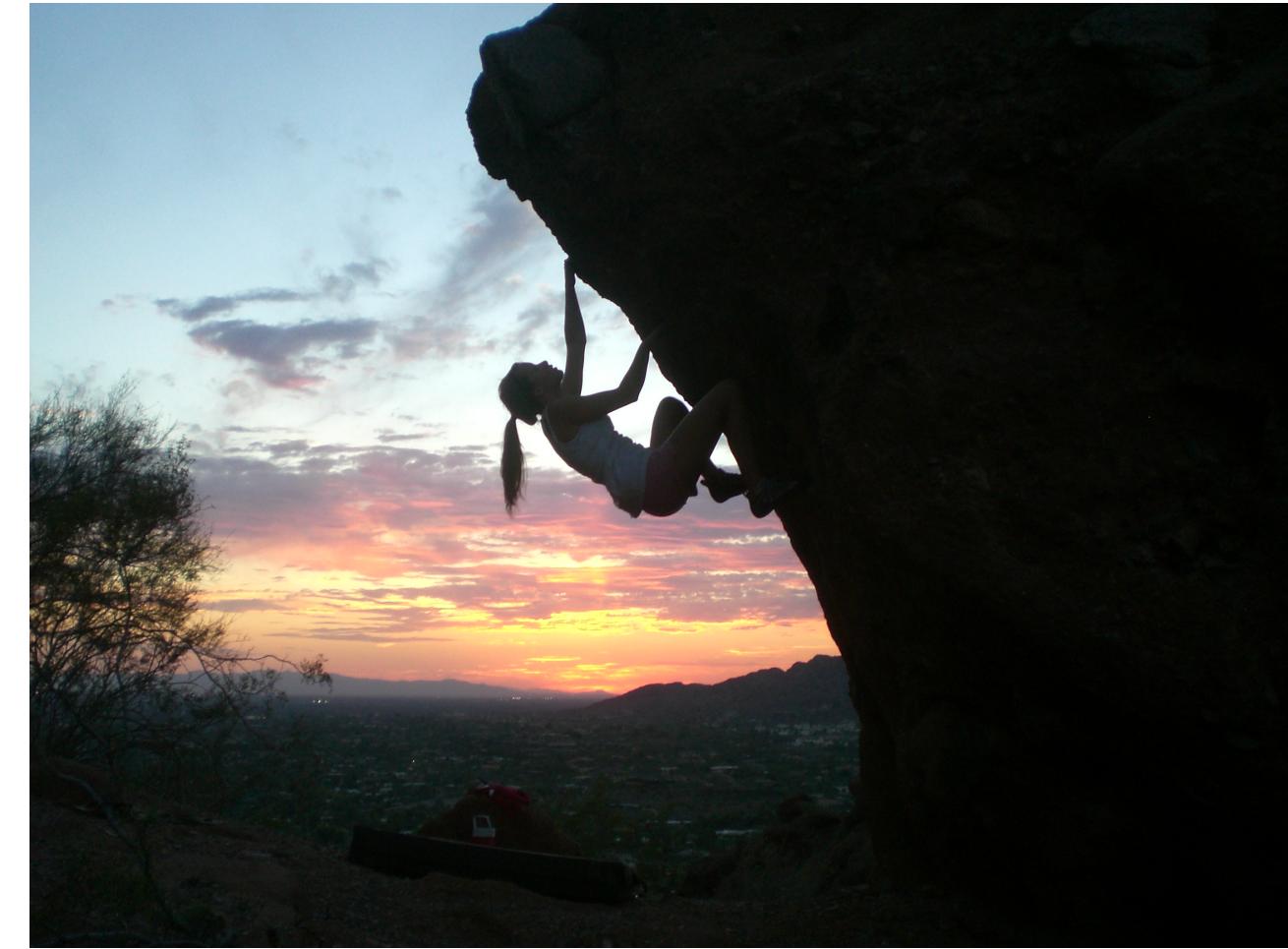


The conceptual side



3 - 5pm

The practical side



1 - 3pm

<https://openedx.uzh.ch>

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

The screenshot shows the OpenEdX platform interface for the University of Zurich. At the top, there is a navigation bar with links like ERC app, ScribblePost, Hyp, PUI, rOpenSci, GG, feedly, Iriss, 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 is a search bar with the placeholder "Happy Dance GIF - Find & Share on GIPHY". A "Sign in" button is located in the top right corner.

The main header features the University of Zurich logo and the text "REGISTER NOW". Below the header, there are several category labels: Chemie, Geographie, and Mathematik (Mathematics) on the left, and Biologie (Biology) on the right. A central box displays the text "WELCOME TO OPENEDX @ UZH!".

The page displays a grid of course cards:

- 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)

At the bottom of the grid, there are three additional cards:

- UZH** (with a grid resistor circuit diagram)
- UZH** (with a cell diagram)
- UZH** (with a landscape photo)

Why alligators?

Data Analysis in Biology

MNF

ENROLL IN BIO144



The details



Are all on openedX

Learning objectives

Schedule

Weekly structure / activities

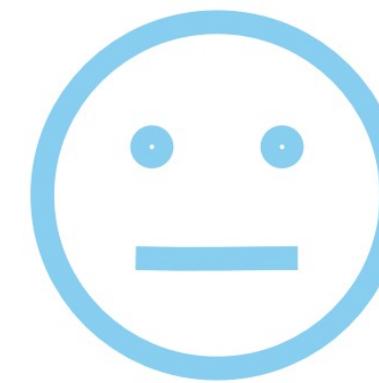
Assessment

Getting help

Giving feedback

Attendance

Email and matriculation number



FEEDBACK

Learning Objectives.

Some variation in amount and type of BC material.

Consistency among instructors / TAs.

Lectures from 3-5pm tough.

Graded assessment questions



Hyperlink



switch

Live data analysis demonstration

BIO144
Week 1

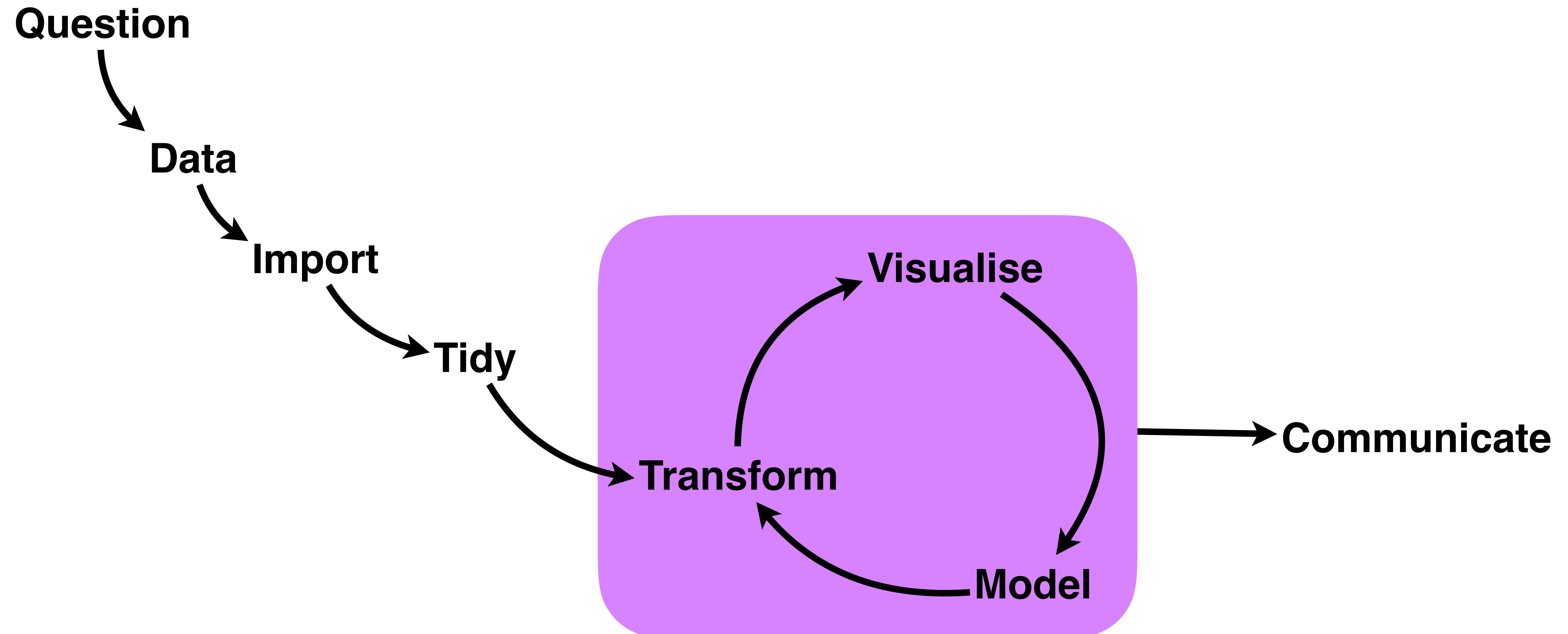
Its a demonstration...

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 now the men know you might do this, it probably won't work!

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What graph?

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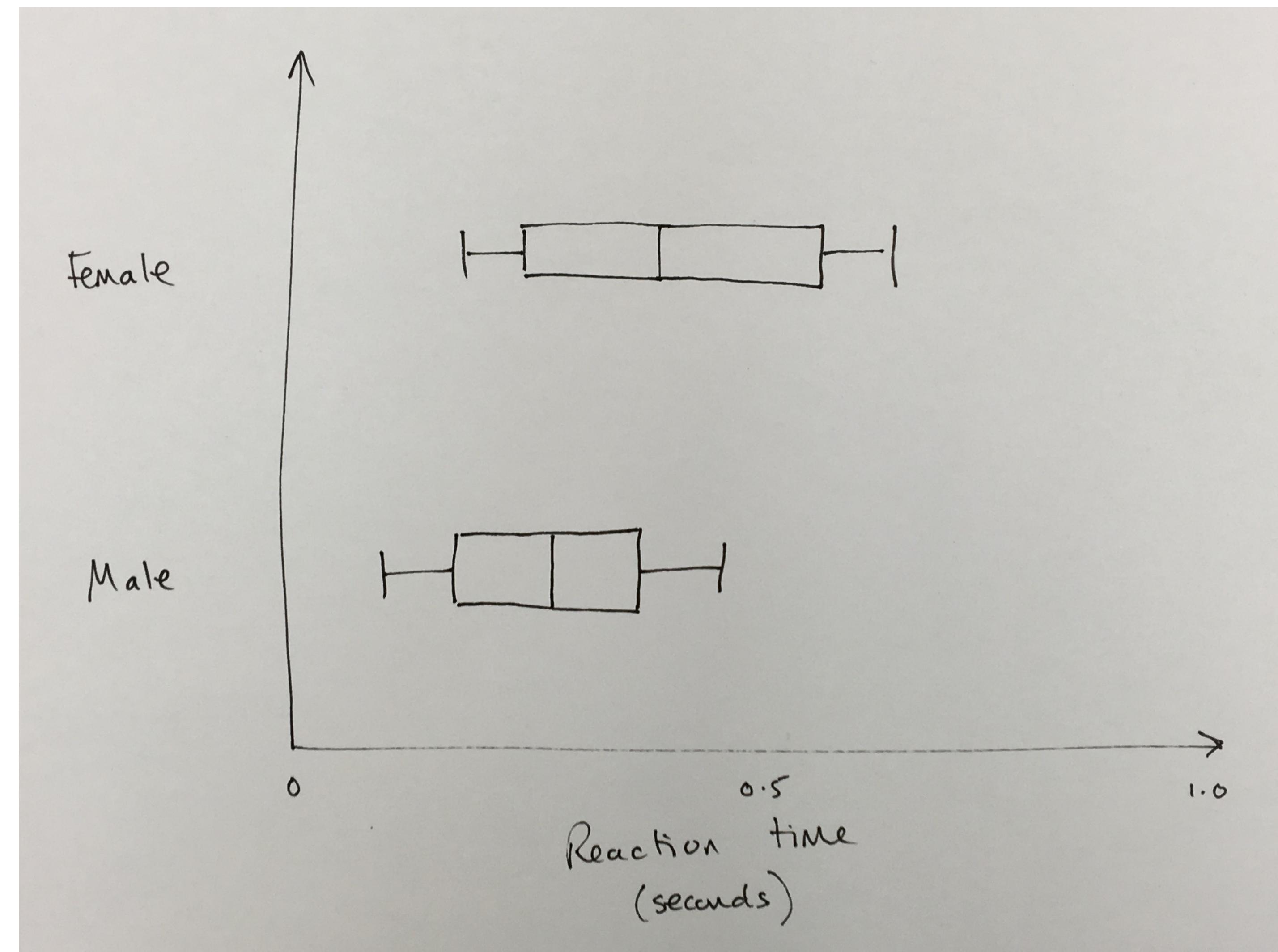
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What statistical test?

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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, Iriss, 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 circle with a white lightning bolt icon. Below it, the text "How powerful is your brain?" is displayed in a large, white, sans-serif font. Underneath that, a smaller text says "Use our targeted tests to find out for free." A "GET STARTED" button is located below this text. At the bottom of the page, there is a white box containing four memory-related tests: Number Memory (red circle with "123"), Reaction Time (yellow circle with a lightning bolt), Verbal Memory (green circle with a book), and Visual Memory (blue circle with a grid of squares). Each test has a brief description below it.

This screenshot shows the same Human Benchmark homepage as above, but with a white overlay at the bottom containing four memory tests. The tests are arranged in a row: Number Memory (red circle with "123"), Reaction Time (yellow circle with a lightning bolt), Verbal Memory (green circle with a book), and Visual Memory (blue circle with a grid of squares). Each test has a brief description below it. At the bottom right of the white overlay, there is copyright information: "Copyright 2007-2016 Human Benchmark" and "contact@humanbenchmark.com". Below that, there are links for "Licensing" and "Terms of Service".

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

The screenshot shows a Google Forms survey titled "My Human Benchmark results". The survey is designed for a live data analysis demonstration in BIO144, Data Analysis in Biology. It includes fields for entering a unique ID code, gender (Female, Male, or Other), average reaction time in seconds, verbal memory test score, and number memory test score.

My Human Benchmark results

For live data analysis demonstration, BIO144, Data Analysis in Biology

*Required

Please enter the unique ID code you gave yourself. *

Your answer

What is your gender? *

Female

Male

Other: _____

Please enter your average reaction time in seconds (e.g., 0.326). *

Your answer

Please enter your score on the Verbal Memory test. *

Your answer

Please enter your score on the Number Memory test

Your answer

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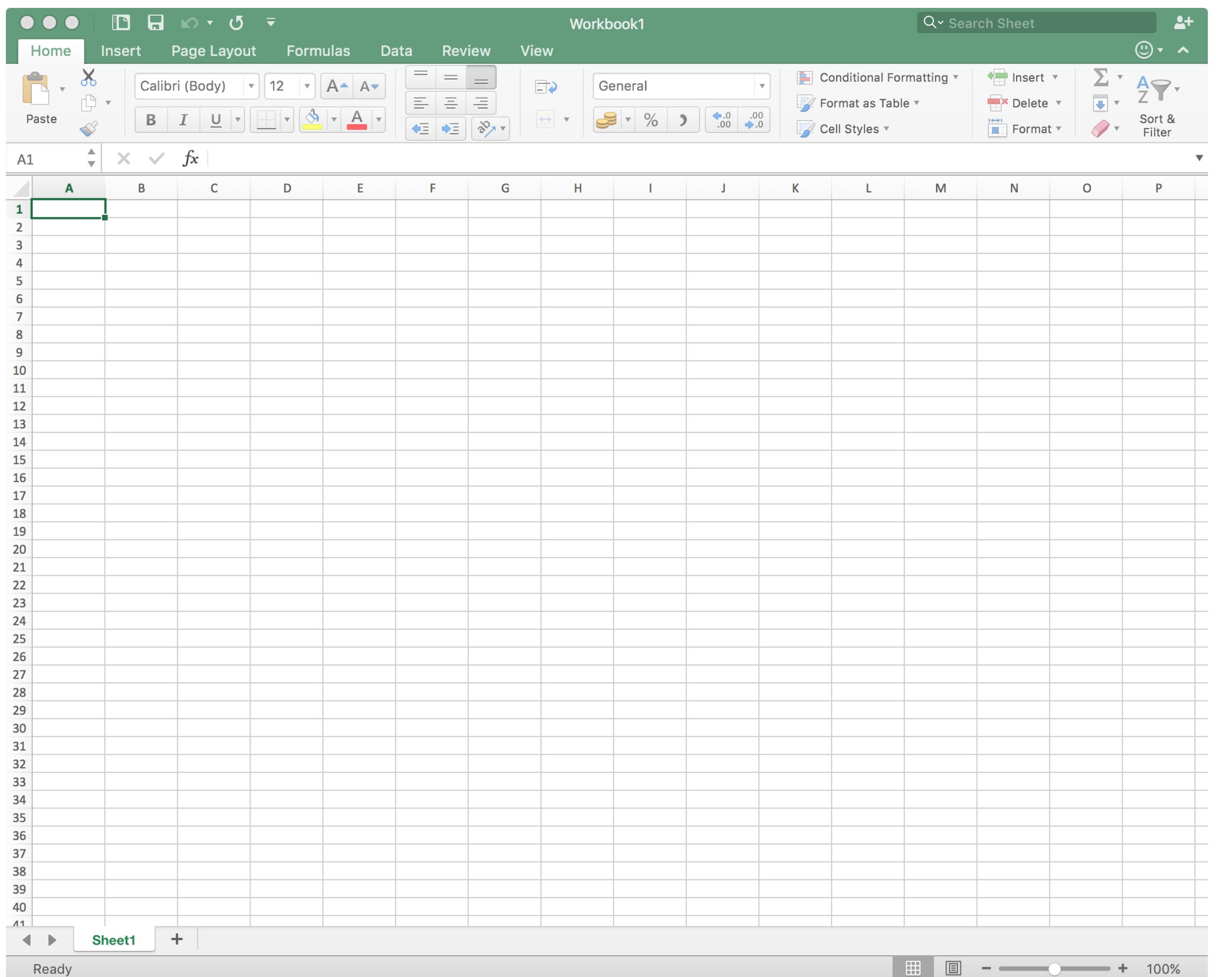
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Check the data in the spreadsheet

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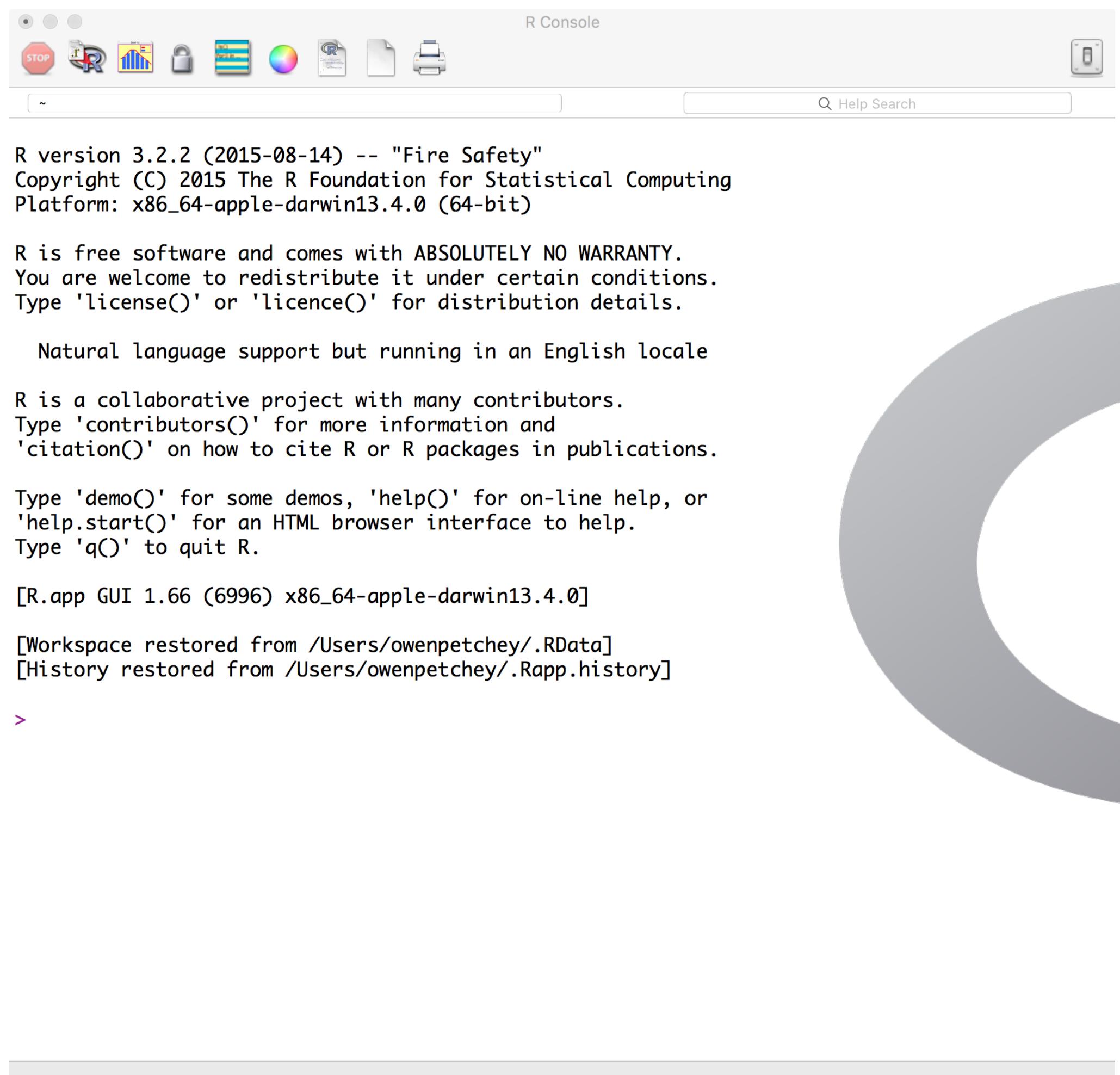
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Live in RStudio

Live data analysis demonstration

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