



# R-Courses Training: Day 01

Introduction to R & RStudio

Presented by Ezgi Karaesmen

# Hello!

## I am Ezgi!

I am a recent PhD graduate from The Ohio State University

I am currently a summer intern at RStudio

I also co-organize R-Ladies Columbus



@e\_Karaesmen

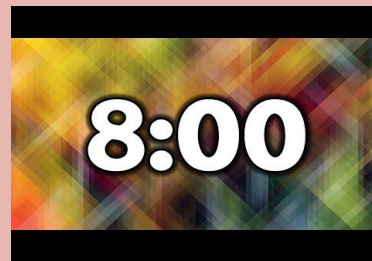


[info@r-courses.com](mailto:info@r-courses.com)

# Your Turn

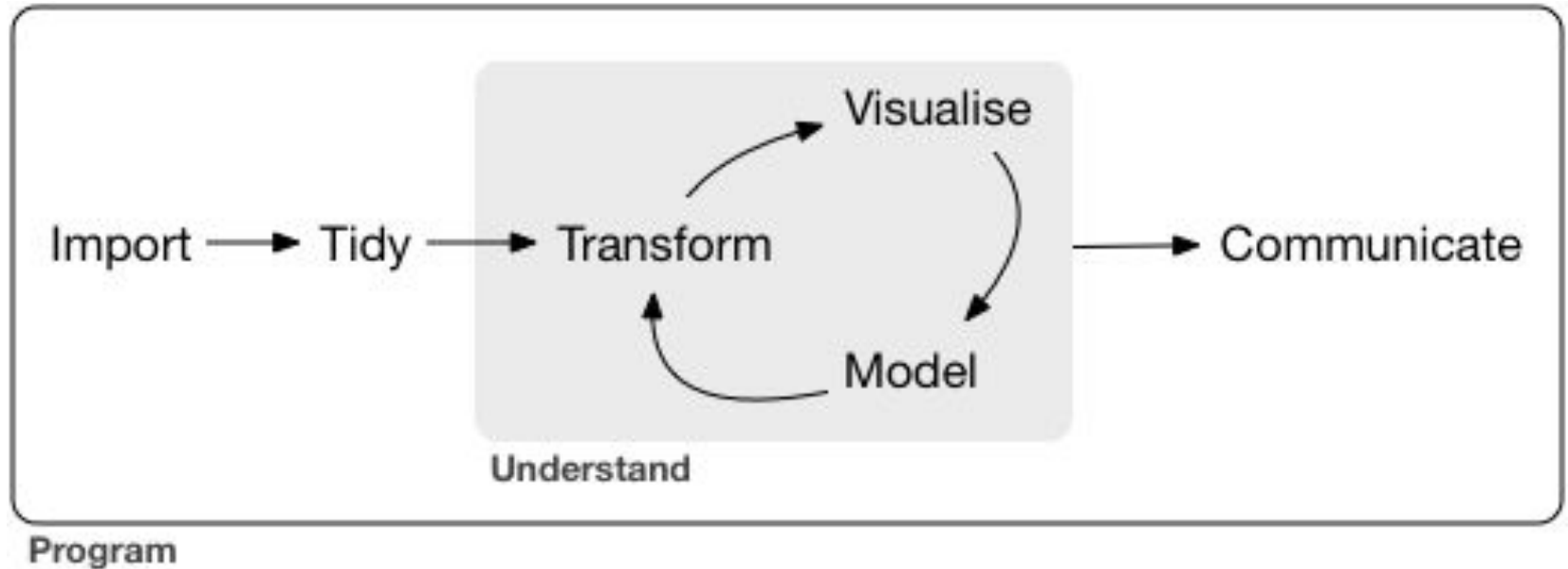
Break into groups of 4-5 people. Introduce yourself to your group members. Tell them:

1. Who you are
2. What you do with data
3. Why you want to learn R

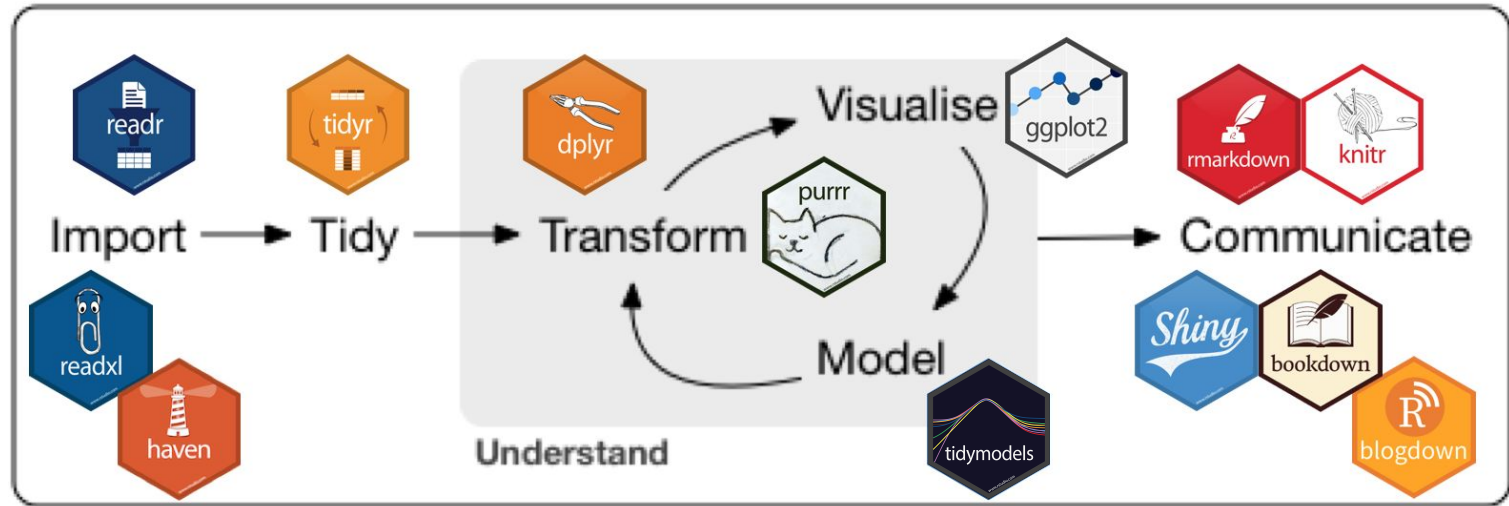


Then, **as a group**, pick a volunteer that will summarize what you talked about to the rest of the class.

# Data Science Workflow



# Data Science with R



Program



data.frames factors strings dates





# R and RStudio

Bonnie and Clyde of the Statistical Programming

# R: A programming language



- Free and open source programming
- Does not need RStudio
- Descends from S programming language
- Created by **R**oss Ihaka and **R**obert Gentleman

# RStudio: A software application



Photo by Alina Grubnyak on Unsplash

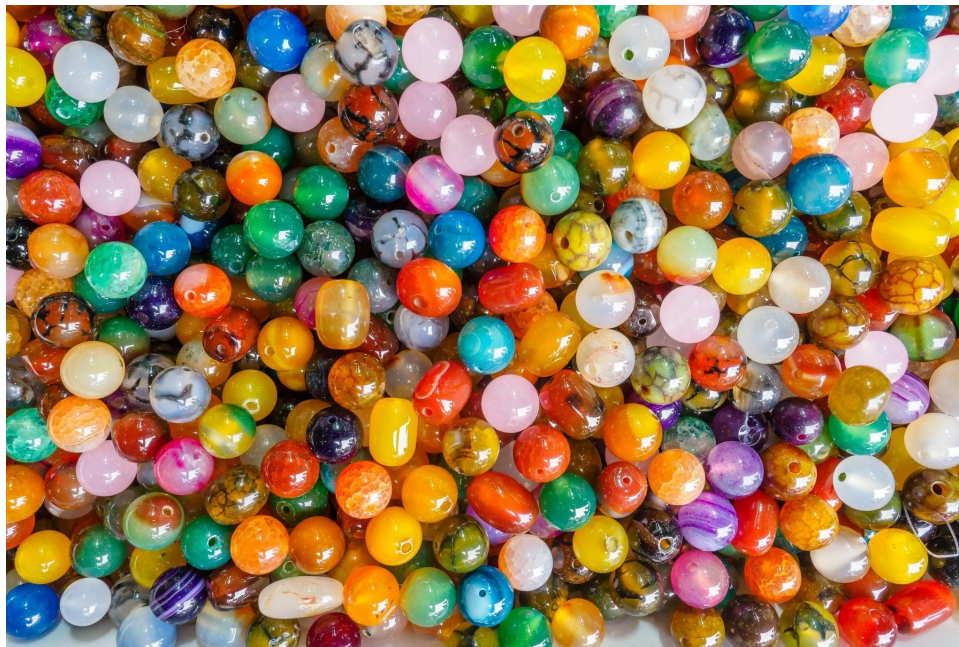
- If R is a pretty painting, Rstudio is the frame that enhances R's beauty.
- RStudio is a free and open-source integrated development environment (IDE) for R
- Built to help you write, run code, and analyze data with R, and also Python
- Text editor, version control, keyboard shortcuts, debugging tools, and much more



# Why learn R?

- Very welcoming and supporting online community
- Programming is a superpower 💪
- Clean, plot, analyze and communicate your data all in one place
- Reproducible
- Automation
- IT'S FREE!

# So many things one can do with R and RStudio



DATA VISUALIZATION

INTERACTIVE APPS WITH SHINY

REPORTS AND BOOKS

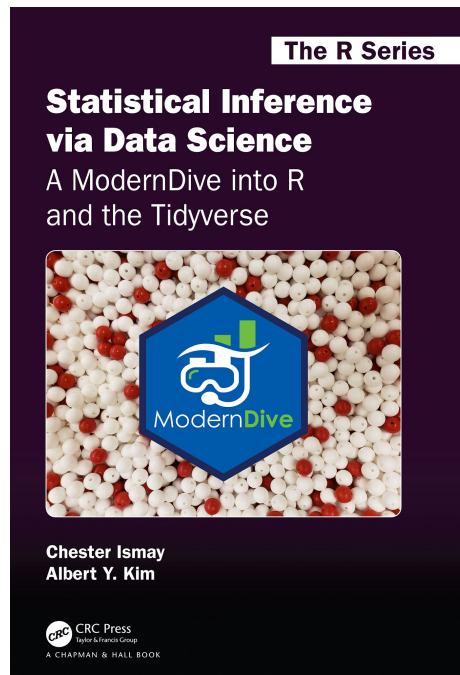
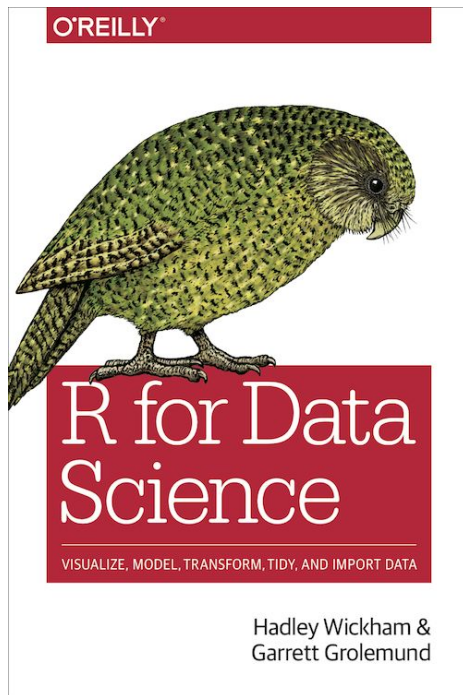
# Your Turn

- Open **00-intro-rmarkdown.Rmd**
- Read through and do everything it tells you to do.



**5:00**

# Resources



 Studio Education



# What I would say to my younger self

1. It's a bit like learning new language...

It requires some patience but is also fun.

2. R communicates with you via errors and warnings. 

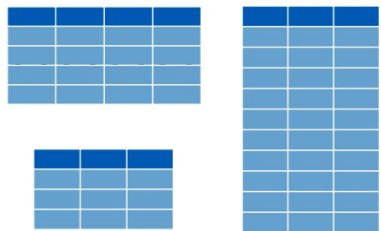
Trying to understand what R is telling you is the only way to establish a healthy and happy relationship.

3. Never underestimate the power of Google 

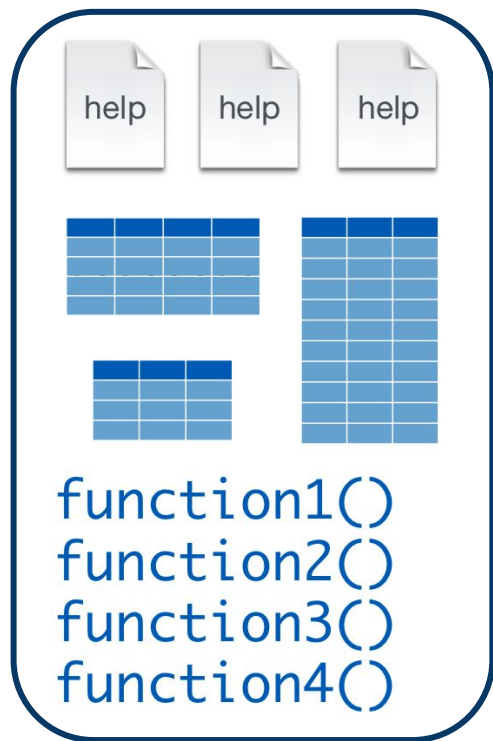
Google is the therapist that helps your relationship problems with R or RStudio



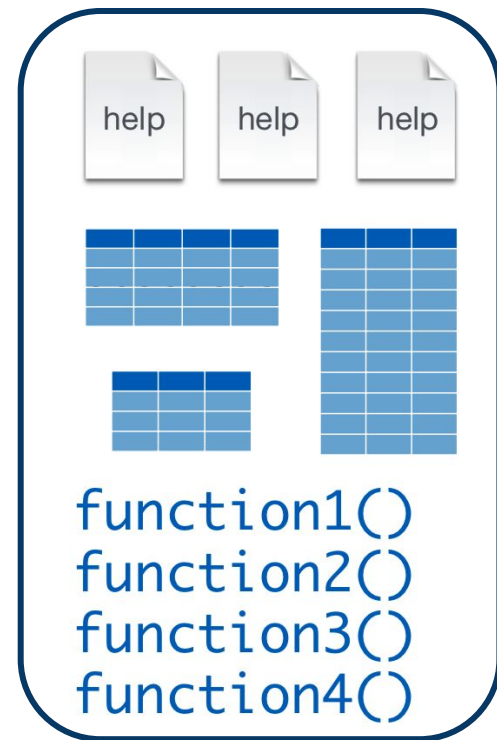
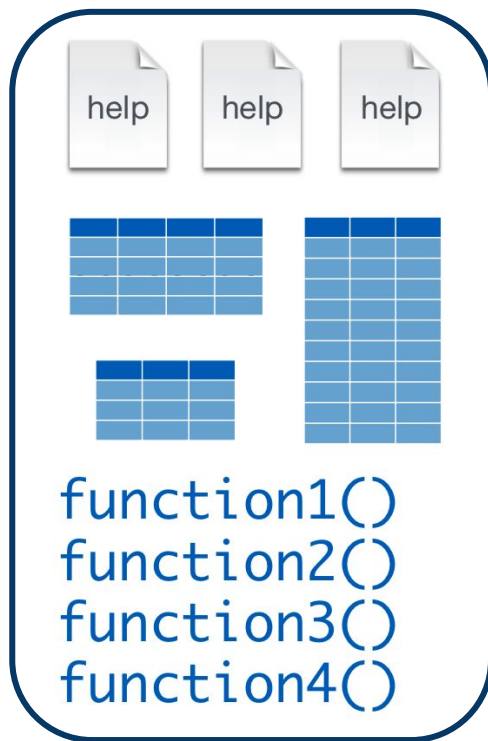
# R Packages



function1()  
function2()  
function3()  
function4()

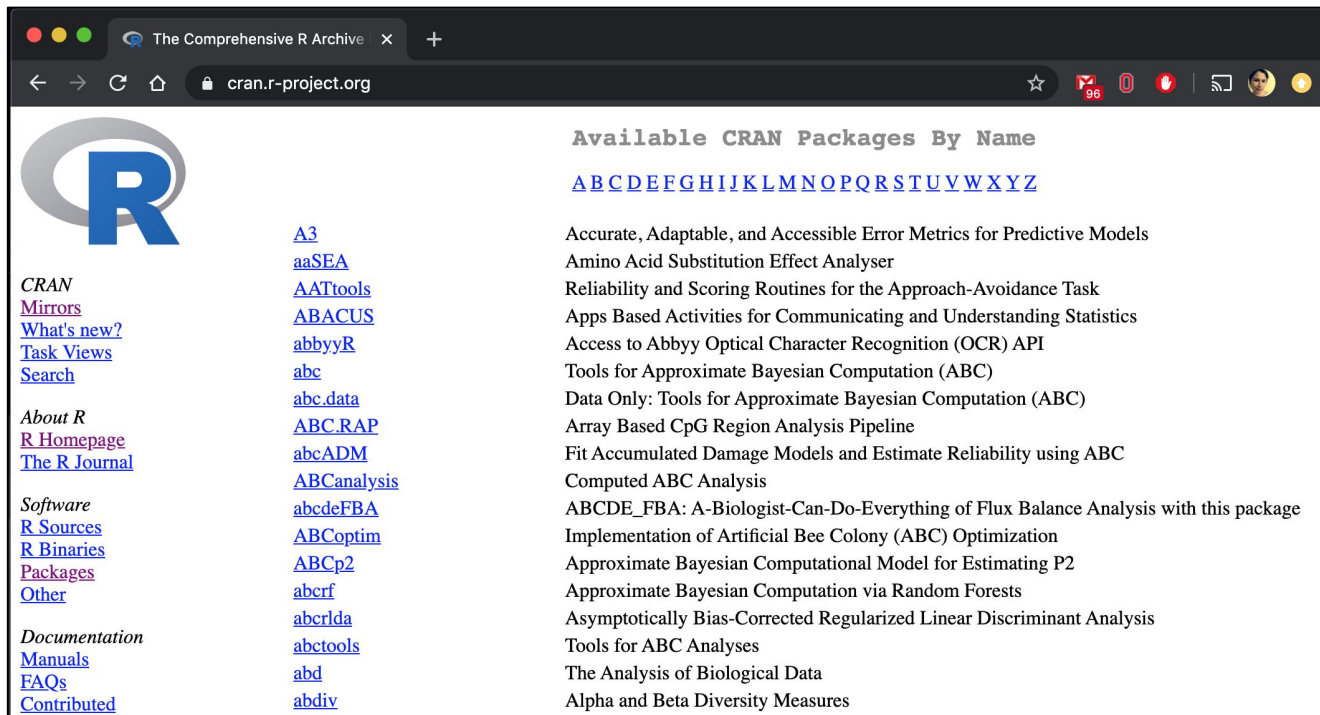


Base R





# The Comprehensive R Archive Network (CRAN)



The screenshot shows the CRAN website in a web browser. The browser's address bar displays 'cran.r-project.org'. The page features the CRAN logo on the left, a navigation menu with links like 'CRAN', 'Mirrors', 'What's new?', 'Task Views', 'Search', 'About R', 'R Homepage', 'The R Journal', 'Software', 'R Sources', 'R Binaries', 'Packages', 'Other', 'Documentation', 'Manuals', 'FAQs', and 'Contributed'. The main content area is titled 'Available CRAN Packages By Name' and lists packages alphabetically from A to Z. The 'A' section is expanded, showing a list of packages including A3, aaSEA, AATtools, ABACUS, abbyyR, abc, abc.data, ABC.RAP, abcADM, ABCanalysis, abcdeFBA, ABCoptim, ABCp2, abcrf, abcrlda, abctools, abd, and abdiv, each followed by a brief description.

**Available CRAN Packages By Name**

[A](#)[B](#)[C](#)[D](#)[E](#)[F](#)[G](#)[H](#)[I](#)[J](#)[K](#)[L](#)[M](#)[N](#)[O](#)[P](#)[Q](#)[R](#)[S](#)[T](#)[U](#)[V](#)[W](#)[X](#)[Y](#)[Z](#)

**A**

[A3](#) Accurate, Adaptable, and Accessible Error Metrics for Predictive Models

[aaSEA](#) Amino Acid Substitution Effect Analyser

[AATtools](#) Reliability and Scoring Routines for the Approach-Avoidance Task

[ABACUS](#) Apps Based Activities for Communicating and Understanding Statistics

[abbyyR](#) Access to Abbyy Optical Character Recognition (OCR) API

[abc](#) Tools for Approximate Bayesian Computation (ABC)

[abc.data](#) Data Only: Tools for Approximate Bayesian Computation (ABC)

[ABC.RAP](#) Array Based CpG Region Analysis Pipeline

[abcADM](#) Fit Accumulated Damage Models and Estimate Reliability using ABC

[ABCanalysis](#) Computed ABC Analysis

[abcdeFBA](#) ABCDE\_FBA: A-Biologist-Can-Do-Everything of Flux Balance Analysis with this package

[ABCoptim](#) Implementation of Artificial Bee Colony (ABC) Optimization

[ABCp2](#) Approximate Bayesian Computational Model for Estimating P2

[abcrf](#) Approximate Bayesian Computation via Random Forests

[abcrlda](#) Asymptotically Bias-Corrected Regularized Linear Discriminant Analysis

[abctools](#) Tools for ABC Analyses

[abd](#) The Analysis of Biological Data

[abdiv](#) Alpha and Beta Diversity Measures

# Using Packages

**1**

```
install.packages("apackage")
```

Downloads package content to computer

**1 x per computer**

**2**

```
library(apackage)
```

Loads package

**1 x per R Session**



# R Functions

# Calling functions in R

R has many built-in functions which are structured like this:

```
function_name(arg1 = val1, arg2 = val2, ...)
```

- For example `seq()` function generates sequences of numbers.
- To see the details for this function type `?seq` on your console.
- Generally this `seq()` function is structured like this:

```
seq(from, to, by)
```

# Calling functions in R

Generally `seq()` function is structured like this:

```
seq(from, to, by)
```

So to generate a sequence of numbers from 1 to 10 increasing by 0.5, we would type

```
seq(from=1, to=10, by=0.5)
```

# You can also have functions within functions

For example I can generate a sequence of numbers from 1 to 10, increasing by 1, compute the mean for this sequence and take its square root.

```
sqrt(mean(seq(from=1, to=10, by=1)))
```

# Your Turn

Open **01-intro-r.Rmd**