Introduction to R and Rstudio Session 2

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Download Materials and extract
files to your project folder

1. Create New Folder in Desktop
2. Name it R_Projects
3. Open Rstudio
        File > New project

4. Name it R_SoAP >
    Browse > set in R_Projects

5. Extract Session docs from Github in to R_SoAP Project
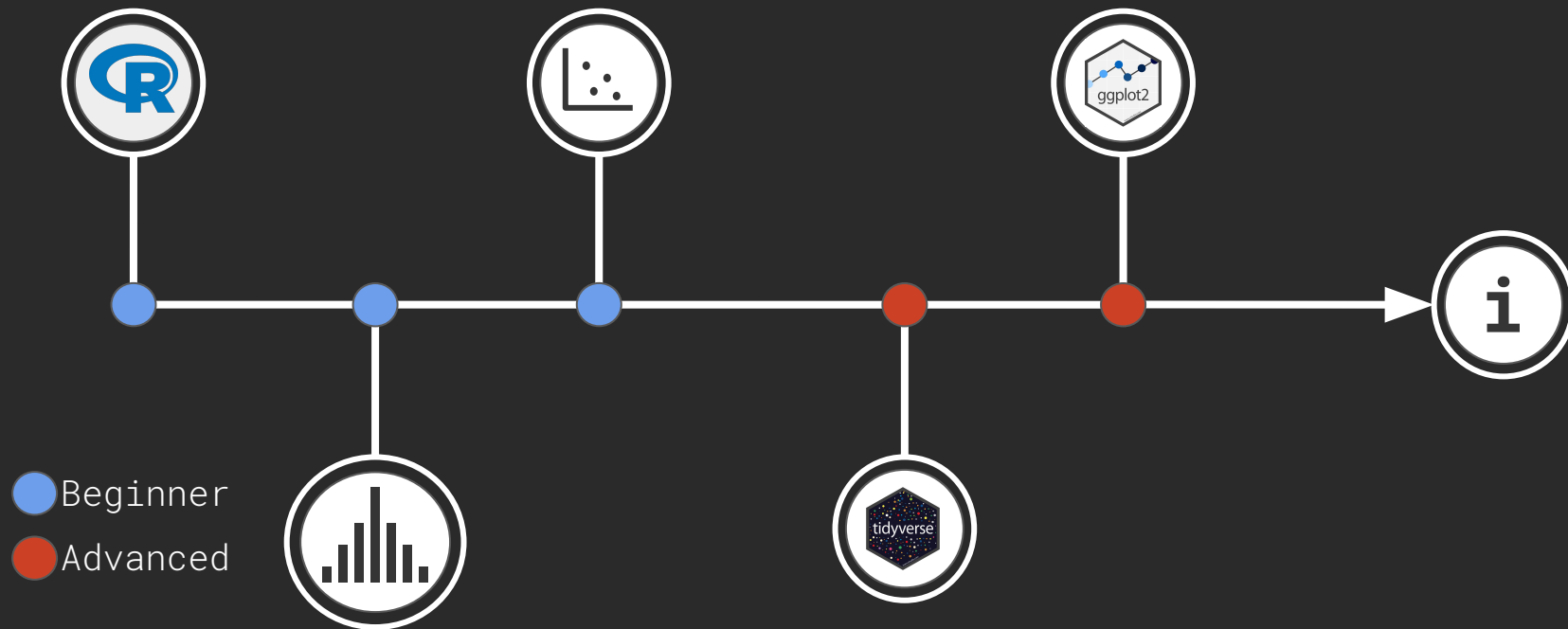
What is R

Packages

Functions

Arguments

Comments

Read files
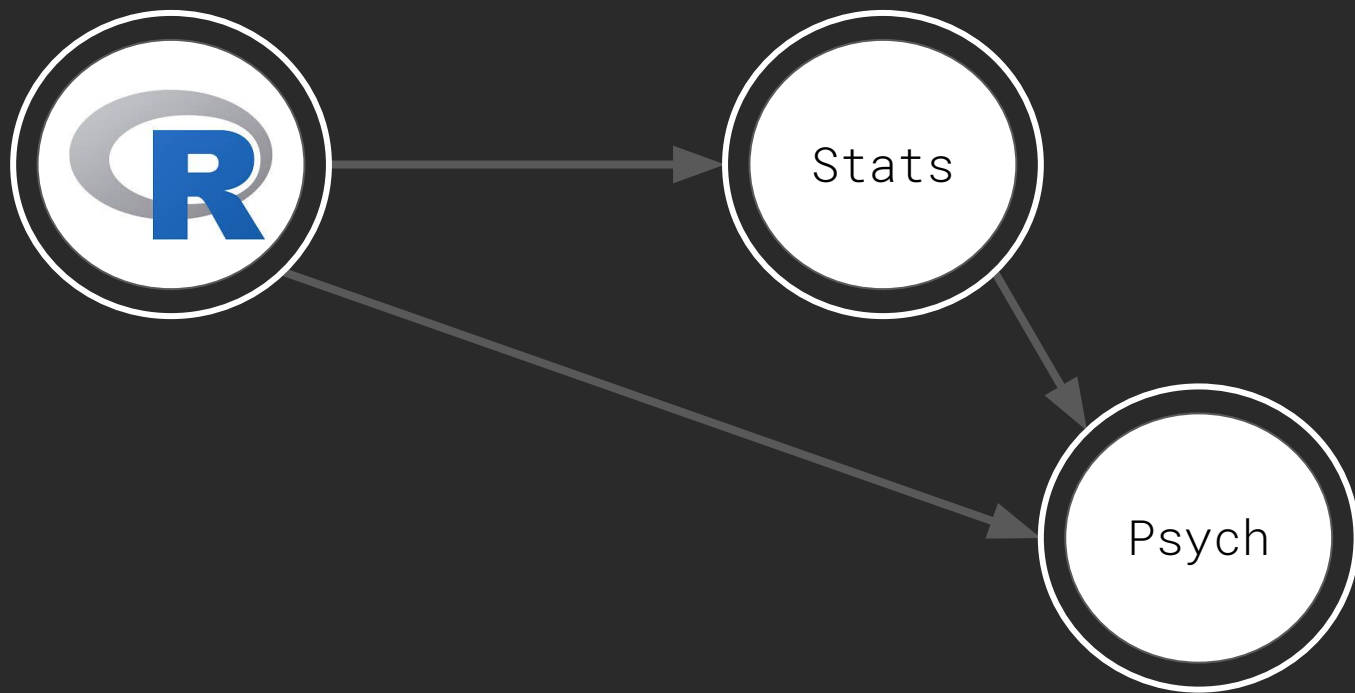
Summarise data

Beginner
Advanced

T-test and correlations

T-test:
- F-test
- Shapiro-Wilks
- One-sample
- Independent Samples
- Paired Samples
- Effect sizes (Cohen's D)
- Post-Hoc Power

Correlation:
- Covariance
- Covariance matrices
- Correlation matrices
- With and without p-values
- Spearman, Kendall, Tau, Phi

Session 2: Learning outcomes

R stats package

T test Workflow

Procedure	Function	Arguments
Import Data	read.csv()	data.csv
Summarise	dfSummary(), describeBy()	Dataframe, factor
Plot Data	hist(), boxplot()	variable
Normality	shapiro.test()	variable
Equal Variances	var.test()	variable
Perform t test	t.test()	Y~X, alpha, H_1 , CI
Interpret output	T-value, C.I.'s, p-value	
Calculate Effect size		

Procedure: t.test()

Groups → A, B

Long Format

ID	Group	Value
1	A	4
2	A	5
3	A	4
4	A	8
5	A	5
6	B	3
7	B	5
8	B	4
9	B	3
10	B	4

Wide Format

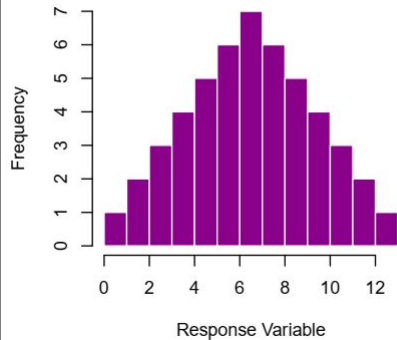| Row	A	B
1	4	3
2	5	5
3	4	4
4	8	3
5	5	4

Data Structure

```r
# We can also save all the plots in a single panel
pdf("Plots/S2_Exercises_Panel_Plot.pdf")        # This will save the plot to "Plot file
par(mfrow=c(2,2))                               # This sets the image parameters, 2 rows, 2 columns

# Histogram of All responses
hist(df.long$Response,                          # Select variable
     main="Histogram : All Response",           # Set main title
     xlab="Response Variable",                  # Set x axis title
     col = "white",                             # Set Colour
     border = "black",                          # Set bar edge colour
)

# Box plot comparing responses
boxplot(formula = Response ~ Condition,         # Select Y and X variables
        data = df.long,                         # Tell R to apply the formula to this data
        main = "Boxplot : Condition x Response", # Set the main title
        col = c("chocolate", "darkmagenta"))    # Set colours

# Histogram of Male responses
hist(df.long$Response[df.long$Condition=="M"],  # Select variable
     main="Histogram : Male Response",          # Set main title
     xlab="Response Variable",                  # Set x axis title
     col = "darkmagenta",                       # Set Colour
     border = "white",                          # Set bar edge colour
     breaks = 14                                # Set n breaks
)

# Histogram of Female Responses
hist(df.long$Response[df.long$Condition=="F"],  # Select variable
     main="Histogram : Female Response",        # Select main title
     xlab="Response Variable",                  # Set x axis title
     col="chocolate",                           # Set Colour
     border="white",                            # Set bar edge colour
     breaks = 14                                # Set n breaks
)

par(mfrow=c(1,1))                               # This returns the image parameters to normal
dev.off()                                       # This closes the graphics device for saving
```
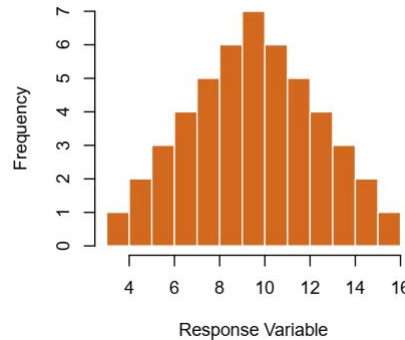
Summary Plots

The t.test() function can perform repeated measures, independent samples or one sample procedures

Arguments (Inputs)

data= MyData

Group names

It outputs means, mean differences

P-values, confidence intervals and t-values

For Long format Data

t.test(Y ~ X, data=MyData)

For Wide Format Data

t.test(A, B, data = MyData)

Function t.test()

Correlation Workflow

Procedure	Function	Arguments
Import Data	read.csv()	data.csv
Summarise	dfSummary(), describeBy()	Dataframe, factor
Plot Data	hist(), plot()#scatterplot	df$Xvariable, df$Y
Normality	shapiro.test()	variable
Equal Variances	var.test()	variable
Perform Correlation	cor.test()	Y~X, alpha, H_1 , CI
Interpret output	r and p-value	
Calculate Effect size	R^2	r^2

Procedure: Correlation
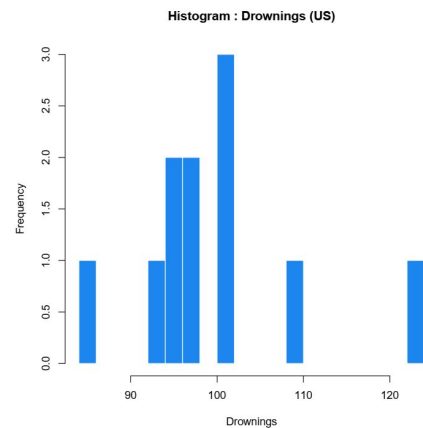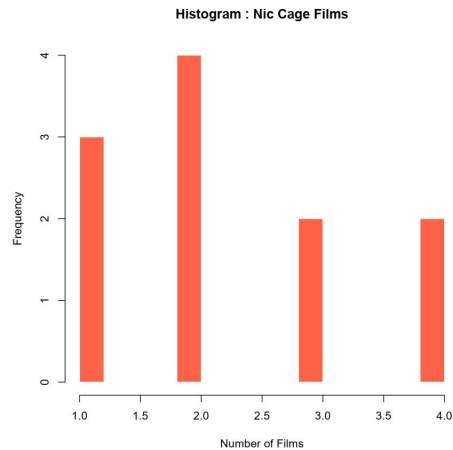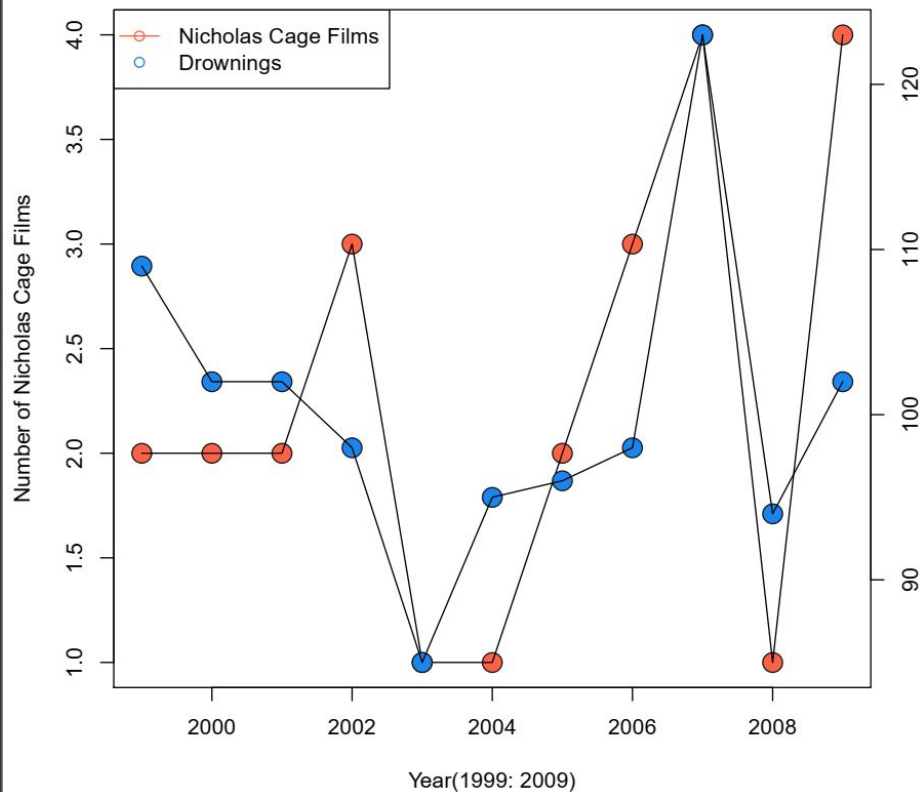
Coffee Break

Session 2 Practicals

Data
The Sound of Intellect: Speech Reveals a Thoughtful Mind, Increasing a Job Candidate's Appeal
Juliana Schroeder and Nicholas Epley
Psychological Science
Vol 26, Issue 6, pp. 877 - 891
First Published April 29, 2015
https://doi.org/10.1177/0956797615572906
Exercise from OpenStatsLab:
https://sites.trinity.edu/osl

Part I:

Reproduce the t-test reported in the article

PAIRED SAMPLES T-TEST

Part II:

Reproduce the correlation

Data Set

Paired Sample T-test:

1. Read in the data file

    "dataTtest.csv"

2. Summarise data
3. Plot data
4. Check Assumptions
5. Perform t-test
6. Calculate Effect size
7. Calculate Power
8. Export summary to File

Correlation:

1. Read in the data file
2. Summarise data
3. Plot data
4. Check Assumptions
5. Perform Correlation
6. Calculate Effect size
7. Calculate Power
8. Export summary to File

Session 2 Practicals

Review