STARTING OFF WITH R AND R-STUDIO

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DO YOU HAVE R AND R-STUDIO INSTALLED?

- First install R – (couldn't load cran website)

- Then install R-Studio - https://www.rstudio.com/products/rstudio/download/

- We will need libraries for certain tools and functions. We will install these as and when needed

THE ENVIRONMENT

- R

    - Farina's introductions

- R-Studio – more user friendly

    - Let's open the console and look at it together. We can use it in the next following exercises.

- getwd()

- setwd() – e.g. setwd("C:/Users/Divya/Documents")

    - This can be made easier in R-Studio with Projects ("E:/R/VisualSearchTaskAnalysis")

- Need the correct wd for R to know where to look, save history and output

BASICS OF PROGRAMMING

- Data Structures – Variable, Vectors (numerical, character, logical), Matrices, Data Frames, and Lists.

    - Lets try creating these in R-Studio

        - Number <- 3

        - Text <- "Trial"

        - X<- c(1:10)

        - A <- matrix(
          ```
            c(2, 4, 3, 1, 5, 7),        # the data elements
            nrow=2,                     # number of rows
            ncol=3,                     # number of columns
            byrow = TRUE)               # fill matrix by rows
          ```

        - X <- data.frame (Name = c("Part1","Part2","Part3"), DV = 1:3)

        - List <- list(Text=Practice, Numeric=6.9, Column = 1:5)

        - typeof(), str()

    - Converting data types – as.numeric, as.factor etc

> Can you add this to your script?
> Where do you see your output?
> What do you see in your environment?

BASICS OF PROGRAMMING

- Arithmetic Operators - + , - , * , / , ^ , **
  - What are these symbols in words?
  - Lets try creating these in R-Studio
  - Number+5
  - X*2

- Logical Operators – > , >= , < , <= , == , != , & ,| , !
  - What are these symbols in words?
  - Some exercises to try these out
    - X[(X<8) & (X>5)] versus A[(X>8) | (X<3)]
  - == is a Boolean operator – True/False

- Math Functions – mean(), sum(), median(), exp(), log()…etc
  - Lets try using this on simulated data
  - M <- mean(X)

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BASICS OF PROGRAMMING

- Functions – Applies a combination of operators and routines
  - Structure - function(var){

    Do something

    Return (new_variable)

    }
  - E.g. ConvertEuroToDollar <- function(Euro) {

    Dollar <- (Euro*1.13)

    Dollar

    }

    ConvertEuroToDollar(5)

- If statements – check if a condition is true or not, and apply function accordingly
  - Structure - if (condition){

    Do something

    } else {

    Do something different

    }
  - Eg: if(Number==3) {

    print(‚Yes‘)

    } else {

    print(‚No)

    }

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BASICS OF PROGRAMMING

- If…Else - condition

  (if(Number==3) {

    print("Yes")

  } else {

    print("No")

  })

- Ifelse - selected from either yes or no depending on whether the element of test is TRUE or FALSE)

- For Loops – Repeat Commands until Condition is Satisfied

  - Structure - for (variable in sequence){

    Do something

    }

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```
for (i in X){

  print(paste("File of Participant", Name))

}
```

IMPORTING DATA

- Reading different kinds of files

  - Read.table

  - Read.csv

  - Read.xlsx (needs library)

- Additional funtions

  - file, header = FALSE, sep = "", (";" ,";" ,"\t",), dec = "." (comma or point)

  - Troubleshooting – try importing in R-Studio via tab under environment

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EXERCISES – LETS INTEGRATE EVERYTHING!

- Open a new script

- Import dataset - ChickWeight {datasets}

- Explore dataset – str(), summary()

- Calculate mean

- Create variables using Operators – calculate deviation from mean

- Write a loop – Check deviated values to determine which chicks are obese and which are normal

  - Use an If statement

- What would you like to do with this data? Can you find a way to do it? Google it!

Can you add this to your script?
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ANSWERS TO EXERCISES

```r
library(datasets)
data(ChickWeight)


View(ChickWeight)
str(ChickWeight)


mean(ChickWeight$weight)
ChickWeight$Deviation <-ChickWeight$weight-121


for(x in 1:nrow(ChickWeight)){
  ChickWeight$Obese<- ifelse(ChickWeight$Deviation < 100,"Normal","Obese")
}
```

PLOTS

- Plot()
  - Weight
  - Diet-Weight
- Hist() – weight or deviation

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REVISION AND DISCUSSION

WHAT ALL DID WE LEARN TODAY? WHAT WILL WE DO NEXT MONTH?