

Assignment 3

Question 1 (15 points)

- a) What is the difference between ANOVA and MANOVA? Provide example of a research question that can be addressed with each. (5 points)
- b) What is the difference between repeated measures ANOVA and an independent samples ANOVA? Provide example of a research question that can be addressed with each. (5 points)
- c) What is the difference between a linear model and a multilevel linear model? Provide example of a research question that can be addressed with each. (5 points)

Question 2 (10 points)

Dataset: Dataset1_Assign3.csv

- a) Test the effect of Effort on Memory, Learning and Attention. Report the results in APA format and provide an interpretation.
- b) What statistical test do you use and why?
- c) Provide all R commands and R output.

Question 3 (10 points)

Dataset: childreading.csv

Source: Jasińska, K. & Petitto, L.A. (2014). Development of Neural Systems for Reading in the Monolingual and Bilingual Brain: New Insights from functional Near Infrared Spectroscopy Neuroimaging. *Developmental Neuropsychology*. 39(6), 421-39. doi: 10.1080/87565641.2014.939180

Description: Children's accuracy and reaction time scores on three different word reading tasks (regular, irregular, nonsense). Children were either monolingual or bilingual.

PID (participant identifier)

MB (monolingual or bilingual)

Age (age of child, and age of adult)

REG_RT (regular word reaction time)

REG_CORR (regular word accuracy rate)

IRREG_RT (irregular word reaction time)

IRREG_CORR (irregular word accuracy rate)

NON_RT (nonword reaction time)

NON_CORR (nonword accuracy rate)

- a) Please determine if group (monolingual or bilingual) affects reading reaction time or reading accuracy on the three word conditions.
- b) Please determine if age affects reading reaction time or reading accuracy on the three word conditions.
- c) What statistical test do you use for this data and why?
- d) Show all R commands and output.
- e) Use ggplot to supply a plot of your data (you decide what is most important to show).

Question 4 (10 points)

Dataset: bdnf.csv

Source: Jasińska, K., Molfese, P., Mencl, W.E., Frost, S., Lee, M., Pugh, K.R., Grigorenko, E. & Landi, N. (2016). Relations Between the BDNF Val/Met Polymorphism, Patterns of Neural Activation in the Developing Brain and Children's Reading and Reading-Related Skills. PLOS One.

Description: Children's scores on different language, reading, and IQ tests. Children's BDNF Val⁶⁶Met polymorphism (CC or CT)

- a) Please determine if group (CC or CT) affects children's abilities.
- b) What statistical test do you use for this data and why?
- c) Show all R commands and output.
- d) Use ggplot to supply a plot of your data (you decide what is most important to show).

Question 5 (10 points)

Dataset: SalesVolume.csv

Description: The data set contains marketing data of a brand of cheese sold in the USA. The weekly sales volume (VOLUME), unit retail price (PRICE), and display activity level (DISP) in various regional retailer accounts are shown.

Variables:

Volume of Product Sold

Price of the Product

Display (amount of activity at the product display in the store)

Retailer (store that sells the product)

- a) Analyze the effect of Disp and Price on Volume of Sales.
- b) What statistical test do you use for this data and why?
- c) Show all R commands and output.
- d) Use ggplot to supply a plot of your data (you decide what is most important to show).