

# PSYC 5316: Advanced Quantitative Methods

Tarleton State University

Lab 1.2 - Basic Statistical Methods in R

This assignment is designed to provide you with practice in doing basic statistical inference in R. For each exercise below, you will use R to perform the inference, and then write your answers to the questions in a Word/OpenOffice document. Thus, you'll need to submit *two* documents in Canvas: (1) your R script, and (2) your Word/OpenOffice document. Be sure to number each problem in both documents.

- Schmidt (1994) conducted a series of experiments examining the effects of humor on memory. In one study, participants were given a mix of humorous and nonhumorous sentences and significantly more humorous sentences were recalled. However, Schmidt argued that the humorous sentences were not necessarily easier to remember, they were simply preferred when participants had a choice between the two types of sentence. To test this argument, he switched to an independent-measures design in which one group received a set of 10 exclusively humorous sentences to remember, and another group received a set of 10 exclusively nonhumorous sentences. The following data represent the number of sentences recalled by each participant:

Humorous sentences	4 5 2 4 6 7 6 6 2 5 4 3 3 3 5 3
Nonhumorous sentences	6 3 5 3 3 4 2 6 4 3 4 4 5 2 6 4

- Construct a table of means and standard deviations for each condition
  - Perform an independent samples *t*-test to test whether there is a significant difference in the recall of humorous versus nonhumorous sentences. Report your test in APA format (e.g.,  $t(15) = 3.62$ ,  $p = 0.001$ )
- At the Olympic level of competition, even the smallest factors can make the difference between winning and losing. For example, Pelton (1983) has shown that Olympic marksmen shoot much better if they fire between heartbeats, rather than squeezing the trigger during a heartbeat. The small vibration caused by a heartbeat seems to be sufficient to affect the marksman's aim. The following experiment was designed to test this claim. A sample of  $n = 8$  Olympic marksmen fired a series of rounds while a researcher recorded heartbeats. For each marksman, a score was recorded for shots fired during heartbeats and for shots fired between heartbeats.

Participant	During Heartbeats	Between Heartbeats
A	93	98
B	90	94
C	95	96
D	92	91
E	95	97
F	91	97
G	92	95
H	93	97

- Construct a table of means and standard deviations for each condition.
- Perform a paired-samples *t*-test to test whether there is a significant difference between conditions. Report your results in APA format.

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3. One possible explanation for why some birds migrate and others maintain year round residency in a single location is intelligence. Specifically, birds with small brains (relative to their body size) may simply not be smart enough to find food during the winter and must migrate to warmer climates where food is easily available (Sol, Lefebvre, & Rodriguez-Teijeiro, 2005). Birds with larger brains, on the other hand, may be more creative and can find food even when the weather turns harsh. Following are hypothetical data similar to the actual research results. The numbers represent relative brain size for the individual birds in each sample:

Non-migrating	Short-distance migrants	Long-distance migrants
18	6	4
13	11	9
19	7	5
12	9	6
16	8	5
12	13	7

- (a) Construct a table of means and standard deviations for each condition.
- (b) Perform an analysis of variance (ANOVA) to determine whether there are any significant differences in brain sizes among the three groups. Report your results in APA format (e.g.,  $F(1, 24) = 4.11$ ,  $p = 0.05$ ).