6/08/20

Agenda for Math 5710 ♬ Meeting #29 ☻☺ 8/03/20 (8:00 a.m. – 9:10 a.m.)

1. Hello:

Brigham City:	Adam Blakeslee	Ryan Johnson	Tyson Mortensen	
Logan:	David Allen	Natalie Anderson	Kameron Baird	Stephen Brezinski
	Zachary Ellis	Adam Flanders	Brock Francom	Xiang Gao
	Ryan Goodman	Janette Goodridge	Hadley Hamar	Phillip Leifer
	Brittney Miller	Jonathan Mousley	Erika Mueller	Shelby Simpson
	Steven Summers	Matthew White	Zhang Xiaomeng	

2. Note the syllabus' activity list for today:

29: M/8/03	1. Apply our understanding of inferential statistics to bivariate experiments and correlation. 2. Construct the concept of statistical power and comprehend its application in applications of inferential statistics 3. Take advantage of Quiz 29.

3. Briefly raise issues and questions prompted by the following homework assignment:

A. Study our notes from Meeting #28.

B. Study the sample response to Quiz #28's prompt.

C*. Comprehend the following case:

A biologist conducted a study to assess the effects of a particular medication on managing the symptom of a particular viral infection in lab rats. She administered the medication to an experimental group of infected rats and a placebo to a control group of infected rats. She then tested the both groups that produced interval scores reflecting the degree of symptoms of the disease the rats exhibited. Let E = the string of scores from the experimental group and C = the string of scores from the control group. She then employed an F-test of the following null hypothesis:

$$H_o : \mu_E = \mu_C$$

Because the F value was such that $p > 0.05$, the researcher did not reject H_o.

Examine each of the following propositions to determine its true value; indicate your choice by circling either "T" or "F" and then write a paragraph defending you choice; post the resulting document using designated *Canvas* assignment link:

i. The results of the *F*-test indicated that the difference in the two means is not statistically significant.

T F

ii. The results of the *F*-test indicated that it is unlikely that the null hypothesis is true.

T F

iii. The results of the *F*-test suggests that there was hardly any difference in the effects of the experimental medication and the placebo on the scores.

T F

iv. The results of the *F*-test indicated that $\left|\overline{E}-\overline{C}\right|$ is too near 0 to justify rejecting H_o

T F

D*. Comprehend the following case:

A biologist conducted a study to assess the effects of a particular medication on managing the symptom of a particular viral infection in lab rats. She administered the medication to an experimental group of infected rats and a placebo to a control group of infected rats. She then tested the both groups that produced interval scores reflecting the degree of symptoms of the disease the rats exhibited. Let *E* = the string of scores from the experimental group and *C* = the string of scores from the control group. She then employed an *F*-test of the following null hypothesis:

$H_o : \mu_E = \mu_C$

Because the *F* value was such that $p < 0.05$, the researcher rejected H_o.

Examine each of the following propositions to determine its true value; indicate your choice by circling either "T" or "F" and then write a paragraph defending you choice; post the resulting document using designated *Canvas* assignment link:

i. The results of the *F*-test indicated that the difference in the two means is statistically significant.

T F

ii. The results of the *F*-test indicated that it is unlikely that the null hypothesis is true.

T F

iii. The results of the *F*-test suggests that there was a difference in the effects of the experimental medication and the placebo on the scores.

T F

iv. The results of the *F*-test indicated that the deviation of $\left|\overline{E}-\overline{C}\right|$ from 0 is unlikely to be solely a function of sampling error.

T F

E. Study the sample responses to the homework prompts posted on the indicated page of *Canvas*.

4. Allude to bivariate data and correlations

A. Measures of consistency ((+, +) & (-, -) v. (+, -) & (-, +)

i	Student	x_i	u_i	i	Student	x_i	u_i
1	A.J.	41	39	20	Jose	39	20
2	Arlene	10	13	21	Joy	31	33
3	Bill	42	14	22	Lucinta	43	41
4	Bonita	30	37	23	Luke	34	33
5	Buddy	17	20	24	Michael	18	18
6	Buhla	38	38	25	Melinda	12	0
7	Cameron	10	9	26	Nadine	37	39
8	Candice	34	21	27	Nettie	40	38
9	Celeste	16	40	28	Ory	23	31
10	Charles	37	37	29	Phyllis	28	33
11	Eloise	35	38	30	Quinn	33	23
12	Elvira	36	41	31	Raul	18	19
13	Evelyn	25	29	32	Ricardo	39	34
14	Garret	34	34	33	Rufus	39	40
15	Gilda	39	31	34	Sidney	14	10
16	Hans	32	36	35	Singh	21	16
17	Hilda	29	40	36	Tomaria	37	37
18	Ira	40	10	37	Zelda	40	31

ILLUSTRATION 16.6

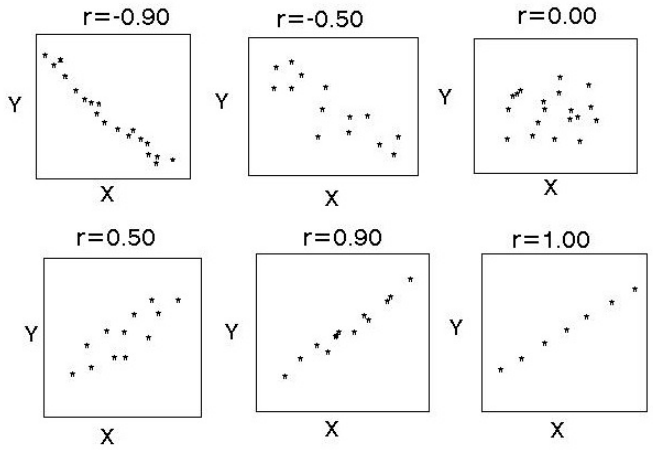
Results from Administration of Test-*x* and Test-*u* to the Same Group of 37 Students

B. Scatterdiagrams (i.e., scatterplots)

C. The Pearson product-moment correlation coefficient:

$$\rho_{(a,b)} = \frac{1}{N}\sum_{i=1}^{N} Z_{a_i} Z_{b_i}$$

Karl Pearson (1857–1936)



5. Comprehend the meanings of the following players in research studies that employ correlational inferential statistics:

A. Random sample

B. Theoretical Sample distribution

C. Random sampling error

D. Null hypothesis (i.e., H_o)

i. $H_o : \rho = 0$

ii. Inferential statistical test – e.g., *t*-test for correlation:

$$t = \frac{r}{\sqrt{\frac{(1-r^2)}{(n-2)}}}$$

ii. Reject H_o ⩔ fails to reject H_o

E. Statistical significance for correlations

F. Some common misinterpretations of inferential statistical results w/r correlations.

7. Note that Jim believes that one of the fundamental causes of prejudiced beliefs is the misapplication of correlations.

8. Construct the concept of *power* in the world of inferential statistics and comprehend the following definition:

   054D. Note: In an experiment that employs inferential statistics, statistical test *A* of a null hypothesis has greater *statistical power* than statistical test *B* iff the likelihood of a Type II is lower for *A* than it is for *B* (i.e., the likelihood of a Type I error using statistical test A is greater than the likelihood of a Type I error using statistical test *B*).

9. Take advantage of Quiz 29.

10. Complete the following assignments prior to Meeting #30:

    A. Study our notes from Meeting #29.

    B. From Canvas study the sample response to Quiz #29's prompts

    C*. Comprehend the following case:

    An educational psychologist conducted a study to assess the relationship between the vocabulary acquisition of pre-school children and their inclination to think divergently. She administered a vocabulary test as well as a divergent-thinking test to a single pseudo-random sample of 150 four-year olds. The resulting string of bivariate data X is of the following form:

    $$X = ((v_1, d_1), (v_2, d_2), (v_3, d_3), ..., (v_{150}, d_{150}))$$

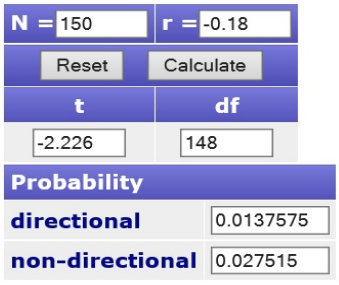
    The resulting sample statistics are as follows:

    $$n = 150 \wedge r = {}^{-}0.10$$

    She tested the following null hypothesis via a *t*-test for correlations:

    $$H_o : \rho_X = 0$$

    The calculation from http://vassarstats.net/textbook/ch4apx.html provided the following results:



Because the t value was such that $p < 0.05$, the researcher rejected H_o.

Examine each of the following propositions to determine its truth value; indicate your choice by circling either "T" or "F" and then write a paragraph defending your choice (upload the resulting document to the indicated assignment section of *Canvas*) :

i. The results of the *t*-test indicated that the correlation coefficient is statistically significant.

T F

ii. The results of the *t*-test indicated that there is a causal effect between vocabulary acquisition and inclination for divergent thinking among four-year old children represented by the study sample.

T F

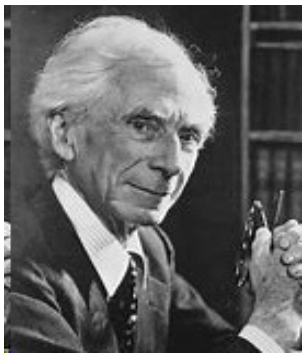
iii. The results of the *t*-test indicated that $|r|$ is so deviant from 0, that H_o should be rejected.

T F

iv. Based on the results of the study, a Type I error is possible but it is impossible to have a Type II error.

T F

D. Study the sample responses to the homework prompts.



11. And from Bertrand Russell (1872–1970):

Most people would rather die than think; many do.