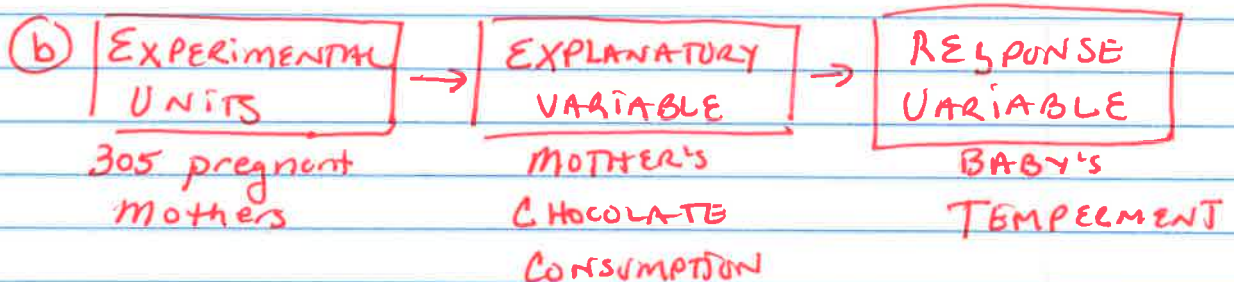


4.2 HW #s 45, 47, 51, 53

45 (a) OBSERVATIONAL STUDY BECAUSE THERE WAS NO TREATMENT IMPOSED ON THE MOTHERS, THE RESEARCHERS SIMPLY ASKED THEM TO REPORT BOTH THEIR CHOCOLATE CONSUMPTION AND THEIR BABIES TEMPERMENT



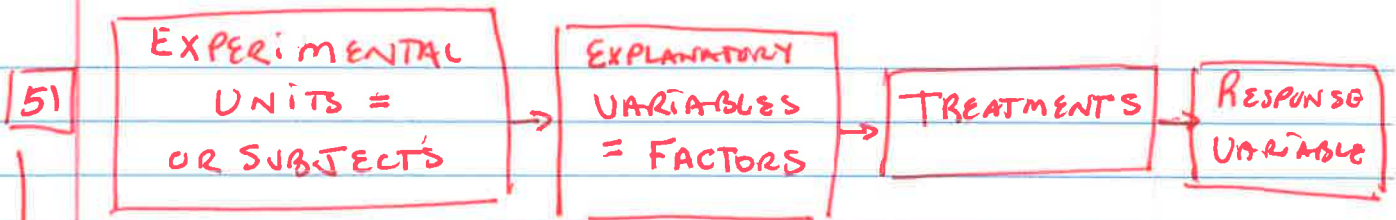
(c) NO, BECAUSE THIS IS AN OBSERVATIONAL STUDY, SO WE CANNOT MAKE ANY CONCLUSIONS ABOUT CAUSE AND EFFECT. THERE COULD BE EXTRANEUS (LURKING/CONFOUNDING) VARIABLES THAT IS ACTUALLY CAUSING THE DIFFERENCE IN TEMPERAMENT.



(a) THIS IS AN EXPERIMENT BECAUSE THERE ARE 2 TREATMENTS AND STUDENTS ARE RANDOMLY ASSIGNED TO THE DIFFERENT TEACHING METHODS

(b) SINCE THIS WAS AN EXPERIMENT WITH PROPER RANDOMIZATION, THE TEACHER CAN CONCLUDE THAT USING THE COMPUTER SOFTWARE APPEARS TO RESULT IN LARGER INCREASES IN TEST SCORES.

4.2 HW CONT.



EXPERIMENTAL UNITS - PINE SEEDLINGS

EXPLANATORY VARIABLE - LIGHT INTENSITY

TREATMENTS

- ① FULL LIGHT
- ② 25% LIGHT
- ③ 5% LIGHT

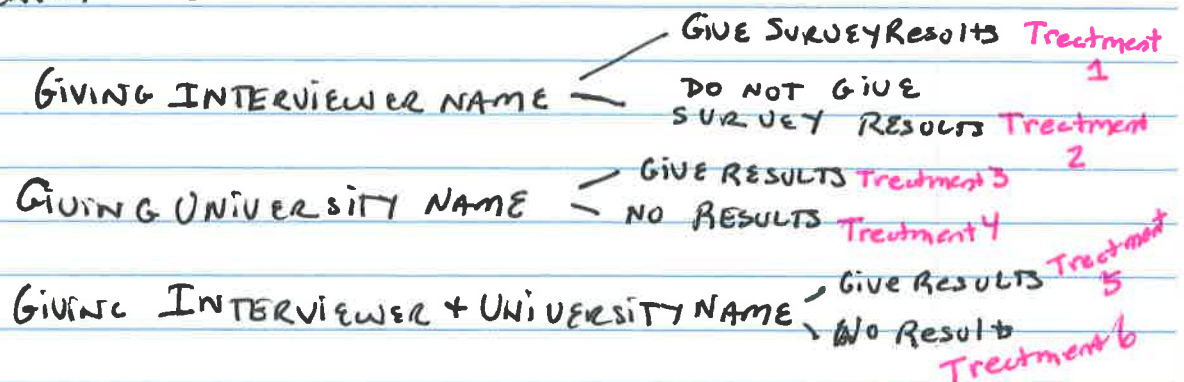
RESPONSE VARIABLE - DRY WEIGHT AT THE END OF THE STUDY

53 SUBJECTS (EXPERIMENTAL UNITS) - INDIVIDUALS CALLED

EXPLANATORY VARIABLES

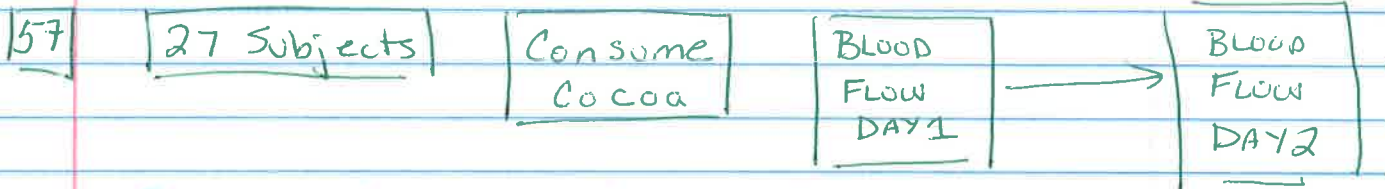
- ① INFORMATION PROVIDED BY INTERVIEWER
- ② CALLER OFFERED SURVEY RESULTS

⑥ TREATMENTS



RESPONSE VARIABLE - INTERVIEW COMPLETED OR NOT COMPLETED

4.2B #s 57, 59, 61, 63, 65



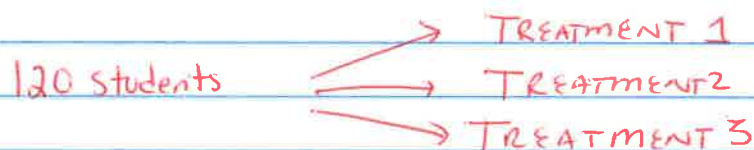
FLAW IN DESIGN IS THERE

WAS NO CONTROL GROUP FOR COMPARISON PURPOSES.

WE DON'T KNOW IF THIS WAS A PLACEBO EFFECT

OR IF THE COCOA ACTUALLY AFFECTED THE BLOOD FLOW

59 3 METHODS TO RANDOMLY ASSIGN SUBJECTS TO TREATMENTS



(a) The hat method (using slips of paper)

- ① write all names on slips of paper
- ② place in a hat and mix thoroughly
- ③ SELECT 1 SLIP ASSIGN TO TREATMENT 1
- ④ SELECT ANOTHER SLIP → ASSIGN TO TREATMENT 2
- ⑤ SELECT ANOTHER SLIP - ASSIGN TO TREATMENT 3
- ⑥ Repeat until the 120 subjects have been randomly assigned to the 3 TREATMENTS

(b) USING A RANDOM NUMBER TABLE (Table D)

- ① ASSIGN EACH STUDENT A NUMBER BETWEEN 001 AND 120
- ② PICK A SPOT ON TABLE D AND READ THE FIRST 40 NUMBERS BETWEEN 001-120 SKIPPING NUMBERS 000, 121-999 AND REPEATS AND ASSIGN THOSE TO TREATMENT 1

4.2 B CONT

59 CONT

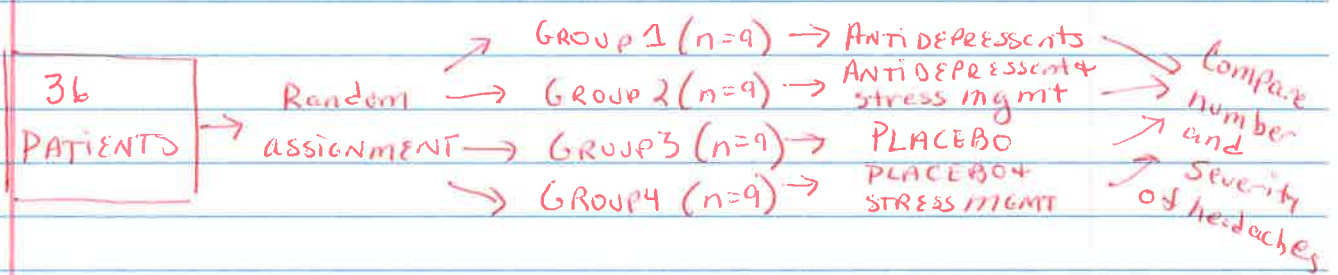
(b) Table D

- (3) ASSIGN THE NEXT 40 NUMBERS TO TREATMENT 2.
- (4) ASSIGN THE LAST 40 NUMBERS TO TREATMENT 3.

(c) USING TECHNOLOGY

- (1) ASSIGN THE STUDENTS A NUMBER 001 to 120
- (2) Use the Random number function on the calculator that does not repeat numbers
- (3) ASSIGN THE FIRST 40 numbers to TREATMENT 1
- (4) THE NEXT 40 NUMBERS TO TREATMENT 2
- (5) THE NEXT 40 numbers to treatment 3

61 (a) COMPLETELY RANDOMIZED DESIGN



(b) PLACE THE 36 Names on a SLIP of paper, PUT THE 36 slips in a hat, mix well.

- Draw 9 slips and assign to Group 1
- Draw the next 9 slips and assign to Group 2
- Draw the next 9 slips and assign to Group 3
- Draw the next 9 slips and assign to Group 4

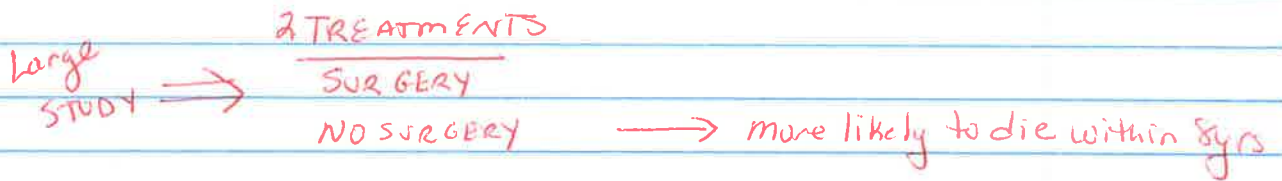
GROUP 1: Maldonado, George, James, Padilla, Acosta, Olgle, Wei, Han, Clemond

GROUP 2: Zhang, Rosen, Solomon, Howard, Edwards, Plochmann, Willis, Duc, Chen

GROUP 3: Wilder, Bennett, Vaughn, O'Brian, Duncan, Liang, Fleming, Trujillo, Valasco

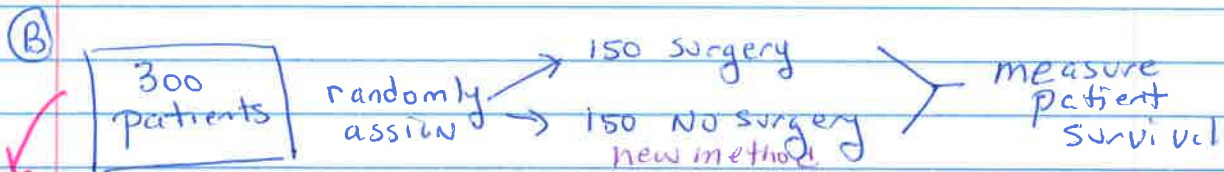
GROUP 4: Ashiro, Bikalis, Tullock, Marsden, Farooq, Montoya, Keplan, Imrani, Hruska

163



(A) Possible Lurking Variables:
Expense, Condition of the patient, etc

In a serious case, when the patient has little chance of surviving, a doctor might choose to not recommend surgery. It might be seen as an unnecessary measure, bringing expense and a hospital stay with little benefit to the patient.



I always find sketching the experiment helps in writing up the design

- ① Randomly assign THE 300 patients to the 2 treatments
- ② One group of 150 patients will get surgery
- ③ the other group of 150 patients will not get surgery (the new method)
- ④ At the end of the study, measure how many patients survive.

4.2 B CONT

(65)

Football
players

Choose

Treatment

- ① EXERCISE
- ② WEIGHT LIFTING

(a) EXPERIMENT VIOLATE PRINCIPAL OF RANDOM ASSIGNMENT. IF PLAYERS ARE ALLOWED TO CHOOSE WHICH TREATMENT THEY GET, THOSE WHO CHOOSE 1 TREATMENT OVER ANOTHER MAY BE DIFFERENT IN A SIMILAR MANNER. FOR EXAMPLE, WEAKER PLAYERS MAY CHOOSE THE NEW EXERCISE PLAN AND STRONGER PLAYERS MAY STAY WITH WEIGHT LIFTING. CONSEQUENTLY, UPPER BODY STRENGTH MEASUREMENTS AFTER 3 WEEKS CAN NOT BE ATTRIBUTED TO THE TREATMENTS BECAUSE YOU CAN NOT DISTINGUISH IT FROM THE STRENGTH OF THE PLAYER.

(b) The response variable of the number of push ups a player can do is a possible response variable but it is only one kind of upper body strength and should probably combined with other measures.

4.2c #'s 62, 67, 75, 79, 85, 91-98

SKIP # 75

62 (A)

EXPERIMENTAL
UNITS



(B) Method to randomly assign plots to treatments

• The easiest way to explain random selection is the "HAT METHOD"

- Label the plots 01-18.
- Write the names on slips of paper (of the same size), place in a hat, and mix well.
- Draw 6 slips and assign these plots to Group 1.
- Draw 6 more slips and assign to Group 2.
- The remaining 6 slips are assigned to Group 3.

My Random assignments:

Group 1: 17, 4, 5, 14, 7, 12

Group 2: 9, 10, 2, 6, 15, 11,

Group 3: 13, 3, 1, 18, 16, 8

Method 2 - Technology

- Number PLOTS 1-18
- Use a random number generator to select numbers 1 to 18, with no repeats
- TI 84 command `randInt NoRep(1, 18)`
- The first 6 numbers are assigned to Group 1, next 6 to Group 2, the final 6 to Group 3.

67 (A)

CONTROL: We need to control for the effects of any extraneous (lurking variables) and use at least 2 groups for comparison purposes.

(B) CONTROLS:

- ① There were 2 groups - half assigned randomly to a preschool program.
- ② All the children had nutritional supplements and social workers

Random Assignment: help create roughly equivalent groups before the treatments are administered.

The children were randomly assigned to the 2 groups

REPLICATION: ENSURES THAT A DIFFERENCE IN RESPONSE BETWEEN THE 2 GROUPS IS DUE TO THE TREATMENTS AND NOT CHANCE VARIATION

There were a total of 111 children in the experiment.

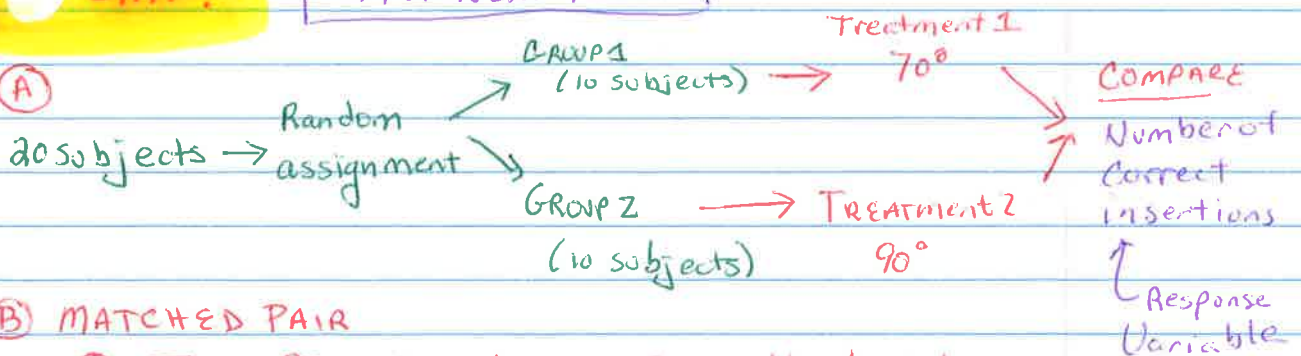
75

SKIP!

#79 ON NEXT PAGE

85

(A)



(B) MATCHED PAIR

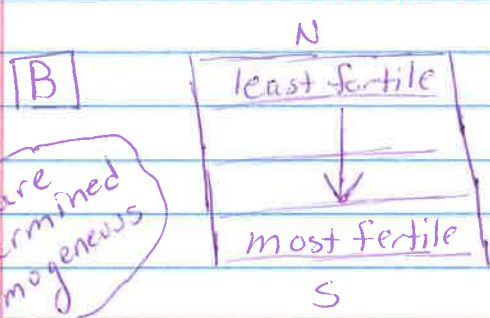
- ① The 20 subjects perform the task twice.
- ② Subjects will perform the task at 70° and 90°
- ③ Use a fair coin Head for 70° and Tails for 90°
- ④ For each subject flip the coin to determine which temperature they do first

#74 [A] THE DIFFERENCE IN SOIL FERTILITY AMONG PLOTS IS A POTENTIAL LURKING VARIABLE.

A COMPLETELY RANDOMIZED DESIGN could assign one of the varieties of corn to more fertile plots just by chance. If those plots produced extremely high yields, so we would not know if the high yields were due to the corn varieties or to soil fertility.

A RANDOMIZED BLOCK DESIGN will allow researchers to control for the variability due to soil fertility by blocking.

Blocks are predetermined and homogeneous



The researcher should use the rows as blocks because all the plots in the same row have the same amount of fertility and so they are as similar as possible.

[C] RANDOMIZED BLOCK DESIGN

Block 1	A ₁	C ₃	E ₅	B ₂	D ₄
Block 2	B ₂	A ₁	C ₃	D ₄	E ₅
Block 3	E ₅	D ₄	C ₃	B ₂	A ₁
Block 4	B ₂	A ₁	C ₃	E ₅	D ₄
Block 5	B ₂	A ₁	C ₃	D ₄	E ₅
Block 6	E ₅	D ₄	A ₁	B ₂	C ₃

- ① LET THE DIGITS 1-5 CORRESPOND TO THE 5 VARIETIES OF CORN (A-E)
- ② USE TECHNOLOGY TO ASSIGN LETTERS TO EACH ROW FROM LEFT TO RIGHT (W→E) SELECT #'s 1-5 with NO Repeats
- ③ Row 1: $\text{randINT NoRep}(1, 5) = 1, 3, 5, 2, 4$
Assign numbers to corn varieties (A-E)
See the table for Block 1
- ④ Repeat the process for the other 5 rows (5 blocks)

4.2C Cont

91) C 2 FACTORS
DIET - NORMAL OR VEGETARIAN
SALT - RESTRICTED OR UNRESTRICTED
4 TREATMENTS

92) A COMPLETELY RANDOMIZED DESIGN
240 subjects random assignment
T1
T2
T3
T4

93) B 11 PAIRS Communities
ADVERTISING
NO ADVERTISING
MATCHED PAIRS

94) D "PLACEBO EFFECT"

95) C "CONFOUNDING"

96) D OBSERVATION STUDY - NO TREATMENT APPLIED

97) C

98) B