

Unit 3 Review Packet (Ch. 11 – 13)

*Key*

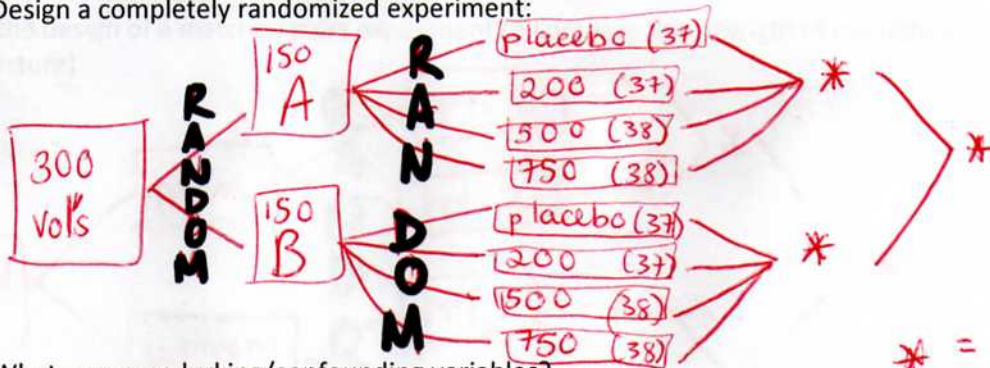
1. A study of the effect of living in public housing on family stability and other variables in poverty-level households was carried out as follows:

The researchers obtained a list of all applicants for public housing during the previous year. Some applicants had been accepted, while housing authority had turned down the others. Both groups were interviewed and compared.

- (a) Observational study or experiment? Why? *observational study - no treatment*
- (b) If this is an observational study, prospective or retrospective? If this is an experiment, what are the treatments?
- (c) What are the explanatory and response variables? *accepted into housing or not      family stability + other variables*

2. 300 graduate students in psychology volunteer to be subjects in an experiment whose purpose is to look at the effect that both dosage level and type of drug have on a performance task. There are 4 levels of drug to be tested: placebo, 200mg, 500mg, 750mg. There are two types of drugs to be tested as well: A and B. We will be measuring the students' scores on the performance task.

- a. Observational study or experiment?
- b. What are the explanatory variables? (there are 2 of them) *drug + dosage*
- c. What is the response variable? *scores on performance task*
- d. Who are the individuals/subjects? *300 grad students in psychology*
- e. What are the treatments? (there are 8 of them)  
*A - placebo    A - 200    A - 500    A - 750*  
*B - placebo    B - 200    B - 500    B - 750*
- f. Design a completely randomized experiment:



*\* = compare scores on perf. task.*

g. What are some lurking/confounding variables?

- *intelligence*
- *skill on task before drug*
- *gender*

3. The following people (listed by last name) are selected by a good sampling method to be in a Randomized Comparative Experiment. We want to assign them to a treatment or a control group.

- |                    |                    |                 |                     |
|--------------------|--------------------|-----------------|---------------------|
| <del>01</del> Wade | <del>07</del> Card | 13 Hill         | 19 Hill             |
| 02 Tapp            | Hyman              | <del>Imoh</del> | <del>Lockart</del>  |
| 03 Deitrich        | <del>Suggs</del>   | Lippa           | Reynolds            |
| 04 Collins         | <del>Dunn</del>    | Martin          | Beale               |
| 05 Brown           | <del>Mitnick</del> | <del>Berg</del> | <del>Moreland</del> |
| 06 Hall            | <del>Gray</del>    | 18 Rogers       | 24 Jones            |

- | TREATMENT | CONTROL             |
|-----------|---------------------|
| Suggs     | Tapp                |
| Dunn      | <del>Deitrich</del> |
| Wade      | Collins             |
| Reynolds  | Brown               |
| Mitnick   | Hall                |
| Berg      | Hyman               |
| Moreland  | Hill                |
| Imoh      | Lippa               |
| Rogers    | Martin              |
| Card      | Hill                |
| Lockart   | Beale               |
| Gray      | Jones               |

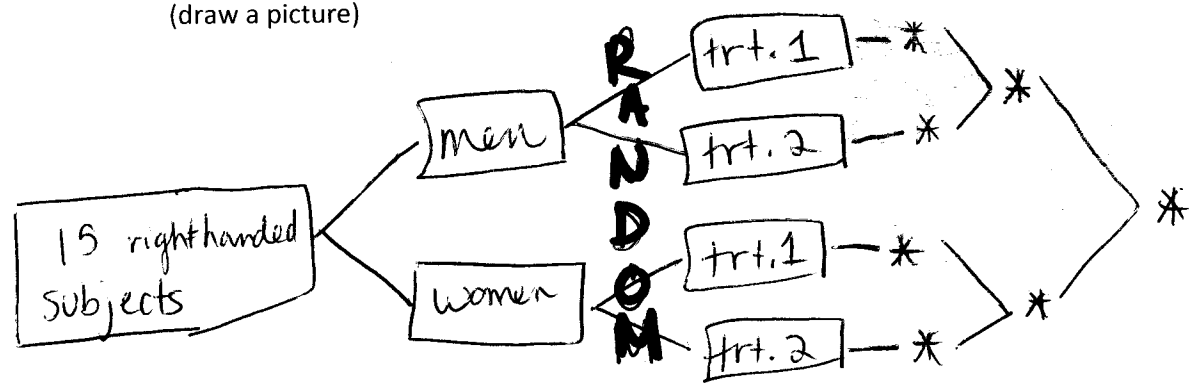
Use the Table of Random Digits below for this assignment:

09949 56572 28104 64281 01217 76250 39511 11059 85172 35273  
 41942 91440 81509 38147 59406 83491 18079 29786 81499 85390  
 88572 01294 14117 56884 77107 53023 02243 26415 52233 12818  
 82868 59988 42323 96542 96733 00056 74887 21914 48300 96404

\* 1st 12 go to treatment - rest to control

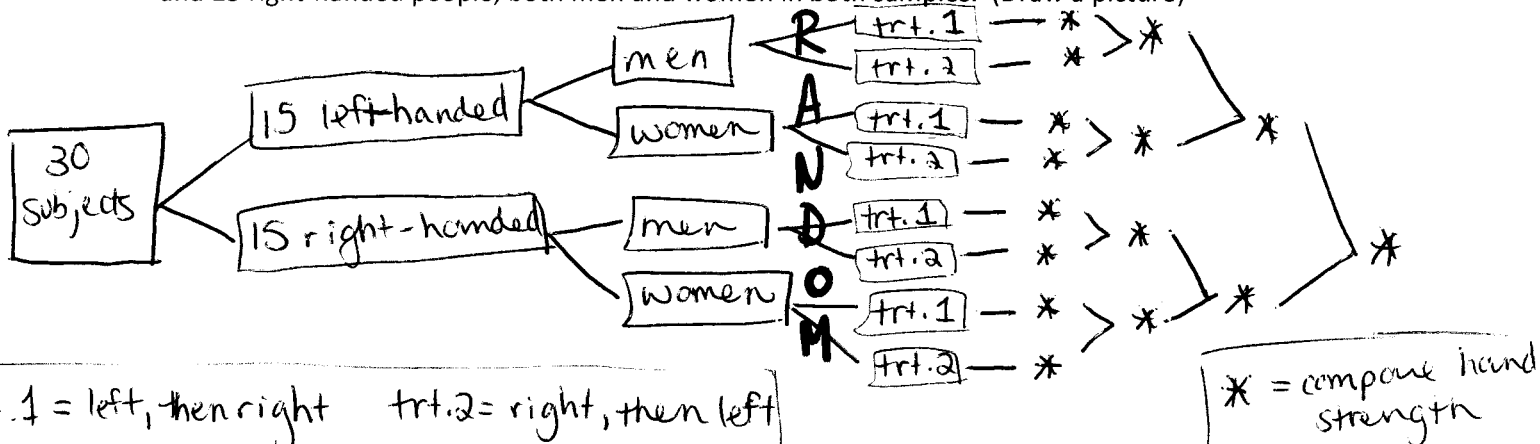
4. Is the right hand generally stronger than the left hand in right-handed people? You can crudely measure hand strength by placing a bathroom scale on a shelf with the end protruding, then squeezing the scale between the thumb (below) and the four fingers (above). The reading of the scale shows the force exerted. You use 15 right-handed people (both men and women) as subjects, all between the age of 20 and 30. You measure the difference between the two hand strengths (right hand - left hand strength, thus positive difference shows right hand stronger, negative difference shows left hand stronger)

- (a) What are the explanatory and response variables? hand strength
- (b) Who are the individuals/subjects? squeezing scale  
15 right-handed people
- (c) What are the treatments? squeezing hand on scale (L and R)
- (d) What are some lurking variables? athleticism, hand injuries, etc.
- (e) Describe the design of a matched pairs experiment to compare the strength of the right and left hands. (draw a picture)



\* = compare hand strength  
 trt. 1 = right hand first, then left hand  
 trt. 2 = left hand first, then right hand

(f) How could you change your design to study the strength of the dominant hand of a person compared to their non-dominant hand? (In other words, how could you alter your experiment to **include** left-handed people, and the comparison between the strength of their left hands to their right hands) You want to study both left and right handed people, and the difference between their dominant hands and their non-dominant hands (in the same manner as the original study). You want to use a sample of 15 left-handed and 15 right-handed people, both men and women in both samples. (Draw a picture)



5. In using the Table of Random Digits in the back of the book repeatedly to choose samples or do experimental randomization, you should not always begin at the same place, such as line 101. Why not?  
*you wouldn't always have the same chance of selecting an exp. unit. Not random!*
6. True or false, about the Table of Random Digits:
  - a. There are always four 0's in every set of 40 numbers **F**
  - b. The chance of selecting 00 is 1/99 **F** It's 1/100
  - c. 0000 can never occur in the table, because this is not random **F**
7. A newspaper article about an opinion poll says "43% of Americans approve of the President's overall job performance during his term in office." Toward the end of the article you read: "The poll is based on unbiased telephone interviews with 1210 adults from around the United States, excluding Alaska and Hawaii. The adults were selected at random from a list of registered voters who listed their telephone numbers on their registration"

(a) What is the population? The sample? 1210 adults from US.

(b) Discuss the problems with this sample survey. Also, what improvements would you make?

- undercoverage - only those with phones
  - undercoverage - excludes Alaska & Hawaii
  - undercoverage - only registered voters w/ phone #'s listed
  - nonresponse - some people might not pick up phone or might hang up
- better sampling frame
- not do phone interviews
  - include Alaska + Hawaii

8. A researcher wants to sample high schools in the United States. He is looking to determine the average weekly income and curfew for high school students. He decides that the grade that the students are in will have a large effect on their responses and he wants to take this into account. He obtains a list from the government of all certified high schools in the country (private and public). How would you create an appropriate sample for him to analyze? (Use both stratified and multistage sampling methods)

- select 2 High Schools from each county (SRS)
- In each high school, separate students into grades (get a list of each) and select an SRS of students in each grade

- separate into counties

9. A management student takes a survey of student attitudes toward part-time work while attending college. He asks a large group of randomly selected students from numerous colleges and finds that 67% of them have a positive attitude toward part-time work while in college.

(a) In this situation what is the statistic? **67%**

(b) In this situation, what is the parameter of interest?

The true % of ~~sto~~ college students who have a pos. attitude toward working

10. It is known that in a specific city the chance that a person has a special gene marker for breast cancer is 14%. A researcher wants to conduct a study of 5 people with these markers. How large of a sample will he need to take from the population of the city to make sure he has 5 subjects with the gene marker? Write instructions for a simulation and conduct three trials. Clearly label each trial and state conclusion.

58280	17867	07990	95055	55279	83390	37598	98350	05666	55402
87042	55080	76185	19947	79551	77594	87381	99430	44251	30896
72183	39856	94385	55160	50680	68443	95437	74302	06204	71004
76768	16066	94009	90635	92058	81744	99133	36354	34292	90092
21703	64616	03431	47610	31968	61593	36259	70600	53491	95542
78269	12087	32204	81177	30333	83630	06026	89308	94179	54907

Trial 1

- Events: breast cancer gene or not
- Use TRD as generator
- 00-13 = has gene
- 14-99 = doesn't have gene
- go until you have 5 people w/ the gene
- Do 3 trials total
- Record # people in each trial

# people
- 25
- 45
- 14

Based on the 3 trials, you would need on average 28 people to have 5 w/ the gene

total 199 people

11. A company employs 14 executives, 35 juniors executive, 50 secretarial staff, and 100 case managers. In an effort to keep informed about possible employee discontent, the company decides to take a random sample of its employees every 6 months, asking questions about job satisfaction.

a. Discuss how you would implement an SRS in this situation

Give everyone a # from #1-199, and randomly select a certain # of these people, using TRD or calculator software

b. Discuss how you would implement a stratified random sample in this situation

Seperate the 199 employees into executives, junior execs, secretaries, and case managers. Take an SRS of 2 executives, 4 junior execs, 5 secretaries and 10 case managers. This total of 21 people would be your sample.

c. Discuss how you would implement a systematic sample in this situation

Wait outside the building one morning and select every 5th person who walked in, and interview them.

d. Discuss how you would implement a cluster sample in this situation

Pick one floor of the office building and interview everyone on that floor.

12. What are the 3 principles of experimental design?

1) Randomization 2) Replication 3) Control

13. What does "statistically significant" mean?

Observing an effect (or response, or difference) so often, that it could not be just chance. Must be

14. What are lurking variables?

A variable that has an effect on the response variable that was not in our study / expt.

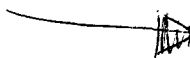
real conclusion / response.

15. What is the difference between bias and variability?

accuracy

precision

16. Draw a histogram that has high bias, but low variability.



17. Draw a histogram that has low bias but high variability.

