

PROJECT 2: SAMPLING EXPERIMENTAL DESIGN

Statistics 401: Fall 2006

Due Friday, September 15

Your write-up for this project must be typed. Please number your answers. Your grade will be determined by how well you answer the questions and by the professionalism and clarity of your write-up.

1. A random sample of size $n = 500$ Montana taxpayers was obtained. Each member of the sample was asked whether or not the state should allow a partial income tax deduction for tuition expenses incurred by parents or guardians who send their children to private schools (including schools having religious affiliations).
 - (a) Is this an observational study or an experiment? Explain why your answer is correct.
 - (b) Identify the sample design that has been used.
 - (c) Suppose that the researcher believes that MT taxpayers with children and MT taxpayers without children might have different opinions about a tax deduction. How can the sampling design be modified to insure that the sample is representative of both groups of parents? Assume that information required to conduct the revised study is available.
 - (d) Give the name of the sample design that is described in (1c).

2. Forty psychotherapists and 212 people undergoing psychiatric care (clients) agreed to participate in a study on how therapist note-taking affects the relationship with a client. Twenty therapists and 106 clients were randomly assigned to each of two groups. The therapists in one group were told to take notes during each session with the clients in that group. The therapists in the other group were told to not take notes, but to write their case summaries after the client had departed. At the conclusion of the five sessions, a measure of the overall relationship of each therapist with his or her clients was taken.
 - (a) What is the population of interest?
 - (b) Give the factor in this experiment.
 - (c) Give the response in this study.
 - (d) What is the name of the experimental design used in this study?
 - (e) Therapist experience could affect the working relationship. Suppose that the therapists can be divided into high and low experience groups. How could this additional information be used to improve the experimental design? Describe your new experimental design.
 - (f) Give the name of the experimental design described in the above question.
 - (g) Give an example of two different extraneous variables and state how “direct control” can be used in this experiment so that these extraneous factors are not confounded with the factor of interest.

3. Do exercise 2.12 on page 37.

4. Do exercise 2.14 on page 37.
5. Do exercise 2.28 on page 42.
6. Do exercise 2.40, page 51.
7. If one is interested in making an inference from a sample to a population, then which of the following is most important? (a) random sampling (b) random assignment
8. If one wishes to make a causal inference (i.e., the explanatory variable causes changes in the response variable), then which of the following is most important? (a) random sampling (b) random assignment
9. Describe the conditions under which a cluster random sample is more efficient than a simple random sample.
10. Describe the conditions under which a systematic random sample is more efficient than a simple random sample.