

# Experimental Psychology

EXP 3082C--Dr. Jay Gould

## CONTROL OF EXTRANEOUS VARIABLES

(Based on Christensen)

The purpose of this exercise is primarily to provide you with experience in identifying uncontrolled extraneous variables and then in developing controls for them. You will probably find it useful to review the “Summary of Extraneous Variables and Controls” in the appendix of the Handbook prepared by the instructor.

Control is the most essential ingredient in experimentation. In order to achieve control one attempts to eliminate any differential influence of extraneous variables. This means that if an extraneous variable cannot actually be eliminated, then a constant/equivalent amount of the extraneous variable must exist at all levels of the independent variable. In this manner any differential influence of an extraneous variable would be eliminated.

The primary goal of control is to achieve equivalency. However, before equivalency can be achieved one must identify the relevant extraneous variables. The following exercise gives you practice in this and other important tasks.

In this important exercise you are presented with a series of examples of experimental procedure control problems. Your goal is to:

- 1) Identify the independent and dependent variables and operationally define them (if given enough information);
- 2) State the hypothesis in the “if. . . then. . .” form;
- 3) Identify the uncontrolled extraneous variable or variables in each research design;
- 4) Indicate how you think these extraneous variables could have influenced the dependent variable or variables under investigation
- 5) Identify control techniques or other ways (e.g., redesigning the study) of dealing with the extraneous variables.

## EXAMPLES OF EXPERIMENTAL PROCEDURE/CONTROL PROBLEMS

A. An investigator had hypothesized that one's store of general knowledge is related to our ability to acquire new information. The investigator randomly selected 15 subjects from the first, second, and third grades. He then had each group of subjects learn the same list of nonsense syllables by the method of serial anticipation and recorded the number of trials required to learn them to a criterion of one errorless trial. The results revealed that the first graders required an average of 25 trials to learn the list of nonsense syllables while the second graders required 20 trials and the third graders required 15 trials. The investigator concluded that the increase in general information provided by our educational system enhances a person's ability to acquire new information.

B. A pharmaceutical company developed a new drug which they thought would relieve depression and naturally was interested in supporting its investment. Consequently, the firm hired a team of researchers to investigate the potential effectiveness of the drug. These researchers identified a group of psychiatric patients who were experiencing chronic depression and randomly assigned half of the patients to the drug group and half of the patients to the placebo group. To avoid any possible confusion in administering the drug or placebo to the patients one psychiatric nurse was told that she was to administer the drug and another nurse was told that she was to administer the placebo. One month later the drug group had dramatically improved over the placebo group and the pharmaceutical company was elated and stated that it had developed a new effective anti depressant drug.

C. A juvenile correctional institution had implemented a "buddy" system with its younger (6-12 year old) juveniles in an attempt to decrease the degree of deviancy exhibited by these children. Naturally, they wanted to determine if the "buddy" system was effective. To accomplish this they administered the "Behavioral Deviance" scale to their residents and selected, on the basis of this scale, the 15 percent of individuals who were the most extreme cases. These individuals were selected because if they could be helped by the "buddy" system then it should also help the less extreme cases. These extremely deviant individuals were then matched on the basis of age, sex, and race with a group of subjects who scored in the "normal" range on the "Behavioral Deviancy" scale. Both groups of subjects were exposed to the "buddy" system and it was hypothesized that the discrepancy between the scores of the two groups of subjects would decrease over time. After the "buddy" system had been implemented for two months the Behavioral Deviancy scale was again administered to the two groups of subjects. It was found that the average discrepancy between the scores of the two groups had decreased significantly. The administrators of the institution were elated and concluded that the "buddy" system was an effective means of reducing juvenile deviancy.

D. An investigator in a northeastern state attempted to determine the effects of a statewide “crack-down” on speeding motorists. To accomplish this he recorded the number of traffic deaths and accidents between the months of November through April. To isolate the effects of the “crack-down” he had to make a comparison with an equivalent state that had not implemented such a “crack-down”. Also, the comparison state had to be as equivalent as possible so he examined the records and identified a midwestern state that had a similar record of traffic accidents and deaths for the preceding two years. He then recorded the number of traffic deaths and accidents for both states for the six month period from November through April and found that there was no significant difference between the two states in number of deaths or accidents. He concluded that the crackdown was totally ineffective in having an influence on the two dependent variable measures he used.

E. An investigator hypothesized that subjects in a fear situation have a desire to affiliate with other individuals. To test his hypothesis the experimenter randomly assigned 50 subjects to either a high or low fear group. The low fear group was told that they would be shocked but that it would only be a small tingle which definitely would not hurt and some probably would not even feel it. The high fear group was told that they would be shocked and that the shock would be quite painful and may burn the skin but would not cause any permanent damage. After being told this, 10 subjects in the high fear group declined to continue to participate in the study. The experimenter released them as he was ethically bound to do and continued on with the experiment even though the number of subjects in the high fear condition was now reduced to 15. Each group of subjects was then told that they were to wait while the equipment was being prepared and that they could either wait in a room by themselves or with others. No difference was found in the extent to which the high and low fear subjects wanted to wait with others. The investigator concluded that fear was not related to affiliation.

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ANSWERS TO CONTROL OF EXTRANEOUS VARIABLES

Problem A) Independent Variable: Increase in general knowledge as provided by the educational system.

Dependent Variable: Ability to acquire new information as measured by the number of trials needed to learn a list of nonsense syllables by the method of serial anticipation.

Hypothesis: If one's general knowledge is increased by information provided by the educational system, then it will enhance a person's ability to acquire new information.

Uncontrolled variable: Maturation differences in the first, second, and third grades represents a confounding extraneous variable. This could be the cause of differences in learning ability.

Control: Use subject's in the same age groups (several for generalizability), providing one-half of the subjects (randomly selected and assigned) with one or more sessions of intense information giving, and using the other half as a control group.

Problem B) Independent Variable: Antidepressant drug (versus placebo). Dependent Variable: Level of depression.

Hypothesis: If chronically depressed patients are administered the new antidepressant drug, then they will improve over those receiving a placebo.

Uncontrolled variable: Experimenter bias, since each nurse knew what they were administering and might have communicated an expectancy to the patients.

Control: Use a double-blind procedure, so that neither the patients nor the people administering the drug know which patient is receiving the drug versus the placebo.

Problem C) Independent Variable: Buddy system.

Dependent Variable: Scores on the Behavioral Deviancy Scale.

Hypothesis: If juvenile delinquents are exposed to a “buddy” system, then their scores on the Behavioral Deviancy Scale will significantly decrease.

Uncontrolled variable: Statistical regression (toward the mean), since extremely deviant subject’s were selected. Upon retesting, their scores would be likely to regress toward the mean and reduce the discrepancy in the two groups’ scores.

Control: Use all juvenile delinquents and randomly assign each subject into either a “buddy” system group or a control group and only administer a posttest. Alternatively, you also could match subjects based on their pretest scores, and use only extreme scoring juveniles.

Problem D) Independent Variable: Crackdown on speeding motorists. Dependent Variable Number of traffic deaths and accidents.

Hypothesis: If a crackdown on speeding motorists is implemented in a northeastern state, then there will be a significant difference in the number of traffic deaths and accidents between the northeastern state and a midwestern state in which no such crackdown was implemented.

Uncontrolled variable: Environment/History, since it is very possible that different winter events, e.g., snowstorms, ice, etc., existed in the two states. If the northeastern state had more hazardous driving conditions, then this could have masked (through confounding in this case) any effect produced by the crackdown. Selection is another uncontrolled variable since the two states in different parts of the country likely differed in many ways other than the matching factors. Note also that failure to reject the null hypothesis is not equivalent to accepting it (problem of negative results).

Control: Select two states that are equivalent in the number of accidents, traffic deaths, weather conditions, mean age of drivers, socioeconomic level, etc.

Problem E) Independent Variable: Instigation of fear. The subjects in the low fear group were told that they would be shocked, but would only feel a small tingle, while the subjects in the high fear group were told that the shock would be quite painful and may burn the skin, but would not cause any permanent damage.

Dependent Variable: Desire to affiliate as determined by their decision to wait in a room by themselves or with others.

Hypothesis: If subjects are exposed to a high fear situation, then their desire to affiliate with others will increase to a greater degree than those subjects exposed to a low fear provoking situation.

Uncontrolled variable: Mortality, since the ten subjects that had declined to participate may have been ones that would have supported the hypothesis.

Control: Reduce the degree of threat in the high fear group's instructions so that they are less likely to withdraw from the study. This is an example where extreme values of the independent variable are not optimal values.