1994

AP PSYCH
MR. AIELLO

Free-Response Question 1

Design an experiment to determine whether a new drug that is supposed to reduce hyperactivity in children actually does. Your essay should include an identification and description of all of the components of your experimental design, including sampling, independent and dependent variables, controls, and the method that you would employ to evaluate the outcome.

Question 1 Scoring Guide

There are five components to this question in experimental design: (1) Sampling; (2) Independent variable; (3) Dependent variable; (4) Controls; and (5) Method of evaluating outcome. Each of these components can earn up to 2 points — 1 for "identification" and 1 for "description." The specific criteria for the 10 points follow:

SAMPLE:

(1) The subjects must be identified as hyperactive children — although points will not be taken off if sample is described as including normal children as well, as long as hyperactive children are in both the experimental and placebo (or control) group.

(2) There must be some indication of a sampling (selection) procedure, e.g., an indication of whether subjects will be selected randomly, or be representative, any notion of subtest of a larger group is acceptable. Control: Demographics not scored in this context.

IV:

(3) The IV is identified as the drug/drug treatment.

(4) The treatment is described, e.g., division of sample into at least one experimental and at least one other group, e.g., one that receives a placebo, other level of the drug, different drug or no drug.

DV:

(5) The DV is identified as hyperactive behavior or a change in hyperactive behavior.

(6) The specific hyperactive behavior to be measured or the method used to determine change (e.g., a scale of 1-100, observation of specific behaviors that may indicate hyperactivity of physical index). "Measuring hyperactivity": not enough.

CONTROLS:

(7) References made to a placebo (or other drug) within the context of a control.

(8) Reference made to other control techniques, e.g., random assignment to treatment groups, double (or single) blind procedures, demographics, drug vs. non-drug groups — in the context of controls.

EVALUATION:

(9) a) Indication that statistics will be used to evaluate difference between groups or b) other approach to determining reliability and/or validity of findings (e.g., replication).

(10) Indication that groups will be compared to determine effectiveness of drug or indication that groups will be significantly different (not necessary to say "statistically significant").

Sample Student Responses

Student Response 1 (Excellent)

An experiment to determine whether a new drug actually reduces hyperactivity in children would begin by randomly sampling within a group of children with certified hyperactivity to control for unknown confounding variables. Then the children would be randomly assigned to either the control or experimental groups. The experimental group is the group recieving the new drug while the control group would not. The independent variable would be the drug and the dependent variable would be the hyperactive behavior. The control group, however, will recieve a placebo to ensure that the administration of any substance is not the determing factor in behavior altering. A double blind will be used - the experimenter will not know which children were given the placebo or the actual drug to ensure no biasing in his/her evaluation. The children will also be uniformed of the nature of whatever substance is being administered so that thier actions will not governed by knowing the effects of the substance. The evaluator will observe the children through naturalistic observation using unobtrusive measures to ensure that his presence does not affect the subjects' behavior. The outcome would be evaluated by

the experiments comparing the behaviors of the control and experimental groups to determine if the drug was correlated with a decrease in hyperactivity. Inferential statistics would then be used to determine if the results occured by chance.

Comment: This essay, which earned 10 points, shows a clear grasp of experimental design and methodology. The faculty consultants were particularly impressed by the student's awareness of the need for experimental controls. The student also has excellent writing skills and expresses himself or herself in a clear and organized fashion.

The student's opening sentence gains 2 points on the issue of sampling. The student recognizes that this study should be done on hyperactive children (not all essayists did). The student also knows that the subjects in this experiment should be selected by sampling to control for "unknown confounding variables." The student proposes a solid experimental design, dividing the subjects into two groups: an experimental group which receives the new drug, and a control group which does not. The student shows awareness of the need to assign the subjects to the two groups on a random basis — one of several indications of this student's grasp of experimental control. The independent variable is explicitly identified as the drug and the dependent variable as the hyperactive behavior. The student recognizes the critical need for a placebo control in this type of research and is able to state why such a control is necessary. The student also recognizes the need for a double-blind design as a further control and clearly describes such a procedure. The student describes a way of measuring the dependent variable "through naturalistic observation using unobtrusive measures." This excellent essay could have been made even better if the student had described some means of objectifying or operationally defining these measurements. The student recognizes the need to compare the two groups to determine the effectiveness of the medication and that statistical treatment would be necessary to evaluate the outcome.

Student Response 2 (Good)

Fifty hyperactive children take part in an experiment to determine whether a new drug that is supposed to reduce hyperactivity in children actually does. Twenty-five of the children are given the new drug for a three month period. The other twenty-five children are not given the drug and represent the control group of the experiment. All fifty children have similar environments throughout the experiment, in an attempt to decrease the number of variables which would affect the outcome.

The independent variable in the experiment, assuming that all environmental variables are eliminated, is the new drug. The variable that is dependent on this new drug is hyperactivity. At the end of the three month period the behavior of both groups of children is observed in a controlled environment. Data is taken and several graphs (bar) are drawn comparing the hyperactivity of the children who took the drug to the hyperactivity of the children who didn't.

If the hyperactivity of the group tested, or of the children who took the drug, was noticeably decreased when compared with the children that did not take the drug, than the new drug should be tested further and eventually administered to all hyperactive children. If the hyperactivity of the tested group is the same as the hyper-

activity of the control group than the drug is not doing what its supposed to do and should not be administered to other hyperactive children. Further experimentation would also be valuable in the second outcome.

Comment: The student recognizes that the study should be done on hyperactive children but does not describe any way of selecting the children for this particular study; i.e., the student does not fully deal with the sampling issue. The experimental design properly divides the subjects into two groups, the experimental group which receives the medicine and the control group which does not receive the medication. The final sentence of the first paragraph begins to address the need for various experimental controls. The student correctly identifies the independent variable and the dependent variable and demonstrates good understanding of these concepts. The student merely says that "data are taken," but does not state how the behaviors on which the data is based will be objectified (operationally defined) to ensure accurate and reliable measurement of the dependent variable. Because of the powerful effects of subjects' expectations and their belief in the efficacy of any medication, particularly a new medicine, a placebo control is necessary in virtually all research on the effectiveness of a particular treatment approach (medical or psychological). The student fails to provide this vital experimental control, and loses the point. The student compares the outcome measures (hyperactivity) of the two groups appropriately and does so with "several graphs (bar)," a descriptive statistical treatment. A stronger essay would have described some use of inferential statistics. The need to do further experimentation, stated in the last sentence, is another way of evaluating the outcome and also would have gained the point. This essay scored a total of 7 points.