DOCUMENT RESUME

ED 091 447 TM 003 665

AUTHOR Huck, Schuyler W.
TITLE A Quasi-Experimental Design for the Assessment of Posttest Sensitization.
PUB DATE [Apr 74]
NOTE 5p.; Paper presented at the Annual Meeting of the American Educational Research Association (59th, Chicago, Illinois, April 1974)

EDRS PRICE MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS *Educational Experiments; *Post Testing; *Research Design; *Testing Problems; Validity
IDENTIFIERS *Test Reactivity

ABSTRACT

Researchers have long been aware that "pretest sensitization" is a potential threat to the external validity of experimental studies. Only recently, however, has it been suggested that "posttest sensitization" might also limit the generalizability of results. This latter phenomenon would exist to the extent that the effects of a treatment are latent and appear only when a posttest is administered. Under this condition, the treatment would work differently for subjects in the researcher's sample than for other individuals who might later receive only the treatment without the accompanying posttest. To be scientifically useful, it is imperative that the hypothesis of posttest sensitization be capable of empirical verification, and a quasi-experimental design is proposed for this purpose. (Author)

A QUASI-EXPERIMENTAL DESIGN FOR THE ASSESSMENT OF POSTTEST SENSITIZATION

Schuyler W. Huck

The University of Tennessee

Researchers have long been aware that "pretest sensitization" is a potential threat to the external validity of experimental studies. Only recently, however, has it been suggested that "posttest sensitization" might also limit the generalizability of results. This latter phenomenon would exist to the extent that the effects of a treatment are latent and appear only when a posttest is administered. Under this condition, the treatment would work differently for Ss in the researcher's sample than for other individuals who might later receive only the treatment without the accompanying posttest. To be scientifically useful, it is imperative that the hypothesis of posttest sensitization be capable of empirical verification, and a quasi-experimental design is proposed for this purpose.

Dr. Schuyler W. Huck
Department of Educational
Psychology and Guidance
The University of Tennessee
Knoxville, Tennessee 37916

A QUASI-EXPERIMENTAL DESIGN FOR THE ASSESSMENT OF POSTTEST SENSITIZATION

Schuyler W. Huck
The University of Tennessee

OBJECTIVE

In 1968, Bracht & Glass published an article in which they extended Campbell & Stanley's (1963) discussion of external validity. In this paper, Bracht & Glass suggest that in addition to pretest sensitization, it is possible that posttest sensitization may limit the degree to which the results of a study can be generalized. The present paper has been written to propose a new quasi-experimental design which can be used to determine empirically whether or not the results of a study can be generalized beyond the subjects used by the researcher to other individuals who will not be tested following exposure to the treatment.

THEORETICAL FRAMEWORK

Researchers have long been aware that the generalizability of results from experiments which involve a pretest may be limited by a possible interaction between the pretest and the treatment. Referred to as "test reactivity" by Campbell & Stanley (1963), this particular threat to external validity would be present to the extent that the pretest sensitizes subjects (Ss) to the forthcoming treatment, causing them to react to the treatment differently than would a similar group of individuals who are not pretested. For a researcher who wants to determine empirically whether or not a pretest interacts with his treatment, the Solomon (1949) four-group design coupled with a two-way analysis of variance of the posttest scores provides a direct test of a possible pretest sensitization.

Recently, Bracht & Glass (1968) have suggested that in addition to pretest sensitization, it is possible that posttest sensitization could limit the degree to which the results of a study can be generalized. Posttest sensitization, as a threat to external validity, would exist to the extent that the posttest provides "cues" to Ss such that the effect of the treatment is more pronounced for individuals who are posttested than it would be for others who are not tested following exposure to the treatment.

Although the problem of posttest sensitization can be circumvented by using an "unobtrusive measure" (Webb, Campbell, Schwartz, & Sechrest, 1966) as the posttest, the nature of the treatment variable in most research studies precludes the use of this type of dependent variable. Thus, there is a need for a research design that can be employed to ascertain whether the treatment of a study would be as effective for a non-posttested population as it is for the specific Ss in the researcher's sample who did, in fact, receive a posttest. This paper has been written to propose such a design.

THE NEW DESIGN

Suppose a researcher takes his available Ss and randomly assigns them to four groups. Two of the groups are exposed to the treatment while the other two are not,

thus creating two experimental groups and two control groups. Following completion of the treatment, posttest #1 is administered to one of the experimental groups and one of the control groups. Finally, posttest #2 is administered to all four groups. In terms of a diagram, the proposed design for investigating posttest sensitization would appear as follows:

R	X	O_1	O_2
R		O_1	O_2
R	X		O_2
R			O_2

with R designating random assignment of Ss to the four groups, X representing the treatment, O_1 symbolizing the first posttest, and O_2 symbolizing the second posttest.

The data from the second posttest (O_2) could be analyzed by means of a two-way ANOVA, with the two factors being (a) treatment vs. no treatment, and (b) exposure vs. non-exposure to the first posttest. This statistical analysis would provide three F-ratios, one related to the main effect of the treatment variable, one related to the main effect of the first posttest, and one related to the interaction between the treatment and the first posttest. The interpretation of a significant treatment main effect would be straightforward; it would indicate that Ss who are exposed to the treatment perform differently (on O_2) than do Ss who are not exposed to the treatment. Likewise, a significant main effect for the first posttest would be eaily interpreted. A significant F here would indicate that Ss who receive the first posttest perform differently on the second posttest than do Ss who are not exposed to O_1, and the phenomenon of "testing" (Campbell & Stanley, 1963) would be the explanation.

The third F-ratio provides information as to whether or not there is an interaction between X and O_1. If this interaction is significant, it would indicate that the effect of the treatment, as shown by subject performance on O_2, varies according to whether or not the Ss are exposed to the first posttest. In other words, if the first posttest sensitizes the Ss to the treatment, in a retroactive manner, then the F-ratio for the interaction would turn out to be significant.

DISCUSSION

The research design that is described above is very similar to the Solomon four-group design in that the interaction F-ratio provides a test of the potential threat to external validity, pretest sensitization in the Solomon design and posttest sensitization in the proposed design. In addition, Ss are randomly assigned to the four groups in both designs, thus insuring high internal validity. In spite of these similarities, Solomon's design is considered to be a "true experimental" design whereas the design being proposed in this paper can only be classified as a "quasi-experimental" design. The latter design must be classified in this manner because it provides only partial, rather than complete, verification of a possible posttest sensitization.

Ideally, posttest sensitization should be investigated by comparing (a) a group of Ss who are exposed to both the treatment and a subsequent posttest, with (b) another group of Ss who are exposed to the treatment, but not the posttest. If the posttest were to interact with the treatment, the first group would be expected to profit more (or possibly less) from exposure to the treatment than would the second

group which does not receive the posttest. However, it would be logically impossible to compare the two groups to see whether they differ, for no data are collected from the second group of Ss. Since there is no way to assess the effect of having one posttest as compared with no posttest, the only possible recourse is to compare the degree to which posttest sensitization exists when there are two posttests as compared with just one posttest, and the proposed quasi-experimental design does just this.

If this design demonstrates that the effectiveness of the treatment varies according to whether one or two posttests are administered, then the researcher can probably assume that the treatment will also have a different effect when it is not followed by any posttest whatsoever. Hence, a significant interaction from the proposed design would indicate that caution should be used in generalizing statements about the treatment (assuming a significant treatment main effect) to individuals who will not be given a posttest. The direction of the difference between the second posttest (O_2) means for the two experimental groups will allow the researcher to make an educated guess as to whether the treatment will work better (or not as well) with the untested population from which the sample of Ss was drawn.

If the interaction from the proposed design turns out to be non-significant, the researcher should not automatically assume that posttest sensitization is non-existent. Suppose that, for a particular study, posttest sensitization is an "all-or-none" phenomenon that takes place instantaneously, as in an "ah-ha" insight, upon exposure to a posttest. The first experimental group would experience posttest sensitization when administered O_1, and the later administration of O_2 would not help to increase further the apparent effectiveness of the treatment. The second experimental group, when exposed to their only posttest (O_2), would be expected to experience the same degree of posttest sensitization as the first experimental group did when given O_1. Under these conditions, the interaction from the two-way ANOVA would turn out to be non-significant, even though posttest sensitization does exist.

Although it is important to acknowledge the possibility that the proposed design might fail to pick up an existent posttest sensitization, the present authors believe that the situation described in the preceding paragraph is not typical nor very realistic. Even though some insights are definitely of an "ah-ha" nature, individuals most certainly gain the insight at different rates. It seems highly probable that some Ss would need the assistance (impetus) of both posttests before gaining the insight, and thus the average performance of Ss in the first experimental group would be higher on O_2, their second posttest, than the average performance of Ss in the second experimental group on the same dependent variable, O_2 being their first posttest. With sufficient power, the proposed design would reveal this difference between the two experimental groups.

In conclusion, the notion of posttest sensitization is a highly plausible hypothesis. It is essential, however, that this hypothesis be capable of experimental verification, for as Helmstadter (1970) points out, "to set up a nontestable hypothesis is to remove the problem from the realm of science, and any conclusions drawn under these circumstances will have to be based on faith, no science (p. 15)." Because of an inevitable Heissenberg effect, the quasi-experimental design that has been proposed in this paper provides only an approximate test of the hypothesis. Until a better procedure is developed, however, this particular research design is worthy of consideration.

REFERENCES

Bracht, G. H., & Glass, G. V. The external validity of experiments. American Educational Research Journal, 1968, 5, 437-474.

Campbell, D. T., & Stanley, J. C. Experimental and quasi-experimental designs for research. Chicago: Rand McNally, 1963.

Helmstadter, G. C. Research concepts in human behavior: Education, psychology, sociology. New York: Appleton-Century-Crofts, 1970.

Solomon, R. L. An extension of control group design. Psychological Bulletin, 1949, 46, 137-150.

Webb, E. J., Campbell, D. T., Schwartz, R. D., & Sechrest, L. Unobtrusive measures: Nonreactive research in the social sciences. Chicago: Rand McNally, 1966.