Non-reactive techniques, observation, and experimentation

In research, the question, hypothesis, research design, data collection strategy, and data analysis procedures are rooted in previous literatures and identified before the project begins. Any changes in the proposed design while carrying out the research would be seen as weakening the validity of the research finding and, well, just bad research practice. An explanatory, also called classical experimental, design is seen as the most robust, since it follows procedures that meet the criteria for proving causality.

It identifies independent and dependent variable, required random assignment of research subjects to experimental and a control group so that both groups are the same, describes procedures for manipulation of the dependent variable(s), and requires development of pretest and posttest instruments and time frames. If this design is implemented then threats to internal validity (proving causality) are removed.

Descriptive designs address correlational relationships between independent and dependent variables, usually through large-scale surveys. Samples are preferably random (representative of the population being studied); however, these samples are not manipulated into control and experimental groups but are surveyed in their own settings using valid and reliable data collection instruments developed in advance of data collection. Such designs do not address threats to internal validity, but they are considered to have stronger external validity (generalizability of findings from the sample to the population of interest) than the explanatory design (Morris, 2006).

The “ Classical” Experimental Design

All experimental designs are variations on the basic classical experimental design, which consists of two groups, an experimental and a control group, and two variables, an independent and a dependent variable. Units to be analyzed (e. g., subjects) are randomly assigned to each of the experimental and control groups. Units in the experimental group receive the independent variable (the treatment condition) that the investigator has manipulated. Contributors in the control group do not obtain the independent variable handling. Pretest and Posttest measures are taken on the independent variable(s), and the control group participants are measures at the same time as the experimental group, although no planned change or manipulation has taken place with regard to the independent variable in the control group.

Researchers often use this design when they are interested in assessing change from the pretest to the posttest, as a result of a treatment or intervention. This design is also known as “ pretest-posttest” or “ before-after” design, to differentiate it from a posttest-only design in which one group receives a treatment, whereas the other group receives no treatment and serves as a control.

The key difference in the posttest-only design is that neither group is pretested, nor only at the end of the study are both groups measured on the dependent variable. Some researchers favor this latter design over the classic two-group pre- and posttest approach because they are concerned that the pretest measures will sensitize participants or that a learning effect might take place that influences individuals’ performance on the posttest (Babbie, 2005).

Ascertaining Causality between Variables

Researchers challenge to establish cause-and-effect associations linking independent and dependent variables by experimental studies.

An experiment characterizes a set of processes to decide the fundamental nature of the causal association linking independent and dependent variables. “ Systematically changing the value of the independent variable and measuring the effect on the dependent variable characterizes experimentation”(Maxfield & Babbie, 2004). Sometimes, the experiment appraises the outcome of arrangements of independent variable comparative to one or more dependent variables. Not considering the quantity of variables considered, and experiment’s crucial purpose challenges to methodically segregate the result of at least one independent variable connected to at least one dependent variable. Simply when this occurs can one choose which variable(s) truly clarifies the happening (Morris, 2006).

To conclude causality, sciencenecessitates that an alteration in the X-variable (independent, influenced variable) go before an adjustment in the Y-variable (dependent, variable predictable for change), with suitable deliberation for scheming other variables that may in reality root the relationship. Perceptive in causal aspects in associations among variables improves one’s perception about experimental data.

Controlling all potential factors that influence those effects of the independent variable(s) on the dependent variable(s) requires considerable effort, knowledge about the main factors, and creativity (Lewis-Beck, Bryman, & Liao, 2004).

Conclusion

In other words, the fact that a dependent variable and an independent variable are strongly associated cannot always be extended to a logical conclusion that it is the value of the independent variable that is causing the value of the dependent variable to be whatever it is.

To achieve causality between variables, one must conduct an experimental study about these variables. Oftentimes, investigational outcome are not constant as they come out. Even though field studies supply purpose insight about probable causes for experiential phenomena, the need of full power innate in such study confines capability to deduce causality. Because neither dynamic treatment of the independent variable by the experimenter nor manage over probable overriding factors happen, no assurance survives that any experiential disparity in the dependent variable essentially resulted from difference in the independent variable (Maxfield & Babbie, 2004).

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