Causal Concepts

**True Experiment**

* Different definitions
* Often cause for debate
* Can be used to refer to any randomized experiment
* The distinguishing feature of true experimental design is that the units of study, are randomly assigned to different treatment conditions

-For example, randomization ensures that the experimental units' treatment condition is not confounded by an alternative cause or systematically introduced difference between conditions. Randomization, therefore, reduces potential threats to experimental validity by dispersing these threats randomly across experimental groups to minimize group differences before treatment begins

Basic design

R X O

R O

Pre-test

R O X O

R O O

Post-test

O R X O

O R O

Conclusion The true experimental design is a synonym for randomized experiments. Randomized experiments are useful because they facilitate causal inference and reduce threats to internal validity. A variety of experimental designs can be used, depending on what research hypotheses are to be tested. However, randomized experiments are often complex, expensive, and difficult to do. Therefore, they should be conducted only after preliminary study results support very specific testable hypotheses.

**Quasi- experiment**

* in which study units are not randomly assigned to observational conditions because of ethical or practical constraints
* Cause must precede effect
* Cause must be related to effect
* Aside from the cause, no alternative explanation for the effect must be plausible
* Validity- inference based on an experiment are only as good as the evidence that support them
  + Number of conditions must be met in order to draw a valid inference
    - First, the internal validity of an inference refers to whether the covariation between the experimental manipulation and the experimental outcome does indeed reflect a causal relationship between the manipulation and outcome.
    - Second, external validity refers to the generalizability of an inference (i. e., do the results of the experiment apply outside of the experimental setting?).
    - Third, statistical conclusion validity refers to the validity of inferences about the covariation between manipulation and outcome
    - Fourth, construct validity refers to the validity of inferences about the higher order construct(s) that the experimental manipulation operationalizes.
* Threats to internal validity are prominent in QE, the threats must be minimized.

**Causal- comparative research**

* Causal-comparative research is a family of research designs used to examine potential causes for observed differences found among existing groups. Causal-comparative research is useful for the study of causes where experimental assignment or manipulation is infeasible, unethical, or in some way prohibited.
* Kids in elementary learning from a new math book, instead of randomly picking students, the researcher will find classrooms with the students using the new and old text book
* Limitations
  + Fallacy of homogeneity- assuming groups are internally homogenous
  + Post hoc fallacy-

**Fish- Quasi Experiment**

**Dog- Quasi Experiment**

**Tortoise- True Experiment**

**Permeability- Comparative**

**Rana- True**