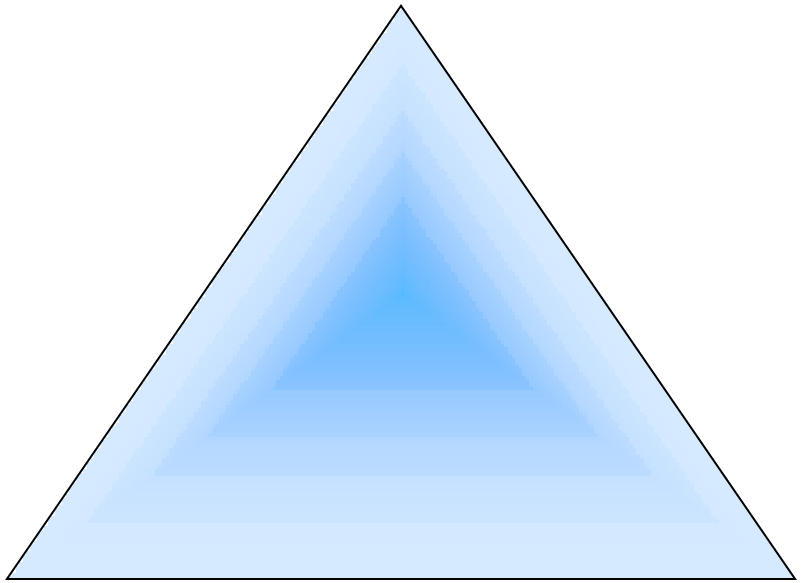
Requirements of True Experiments

Research Objective

Study relationships among variables for existing groups

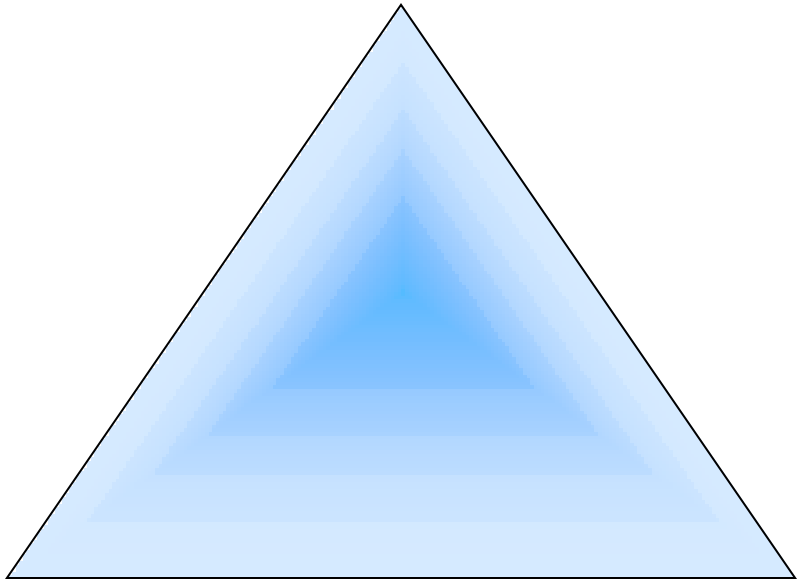


Show direct cause & effect

Explain outcomes after the fact

Type of Design

Cross-Sectional
Longitudinal



True Experiment
Quasi-Experiment

Explanatory Case Study
Exploratory Case Study

True Experiments

- True experiments demonstrate (or not) direct cause and effect.
- The researcher's objective is to show that the treatment or intervention produced an effect and that this effect could not possibly have been due to anything besides the treatment.
- Therefore, the design must ***eliminate all factors that could influence the outcome other than the treatment or intervention.***

Two Requirements

- The treatment or intervention must produce an effect.
- This effect must ***not*** appear when there is no treatment or intervention.

Direct Causality
Treatment or Intervention
Causes Response

If X, then Y

If I poke it, it jumps

Direct Causality
Lack of Treatment Produces NO Response

- If NO X, then NO Y
- If I DON’T poke it, it doesn’t jump

Sampling for True Experiments

- Differences among study participants must be minimized because these pre-existing differences could affect the outcome, the response to the treatment.
- Therefore, the theoretical population, accessible population, and sample must be as homogeneous as possible with regard to characteristics ***that could be expected to affect the outcome or response to the treatment or intervention.***
- If we could, we would use clones. In fact, some biological research ***does*** use clones. But we cannot.
- Therefore, we ***screen potential participants*** to eliminate those who have characteristics that may affect the outcome of the experiment.

Screening vs. Judgmental Sample

- This is ***not a purposive or judgmental sample.*** We are simply eliminating people who have characteristics that we know (or suspect) could affect the outcome.
- For example, assume we have developed intervention designed improve self esteem of overweight adolescent females, a mentoring program.
- We might eliminate participants who are participating in weight loss programs because they could well be gaining in self-esteem from weight loss, not our intervention. We might also eliminate participants who have experienced suicidal impulses because they are experiencing psycho-social phenomena beyond the scope of our intervention.

Random Assignment

- Even with screening, people are not clones. They differ in many ways and we cannot even identify, much less eliminate, all of their characteristics that might affect the outcome of an experiment.
- True experiments therefore depend on ***random assignment*** to treatment and control groups.

Random Assignment Vs. Random Selection

- Random assignment and random selection are not the same thing.
- Random selection refers to how we select the sample.
- Random assignment refers to how we assign participants to the treatment and control groups.

“Real” Samples for Experiments

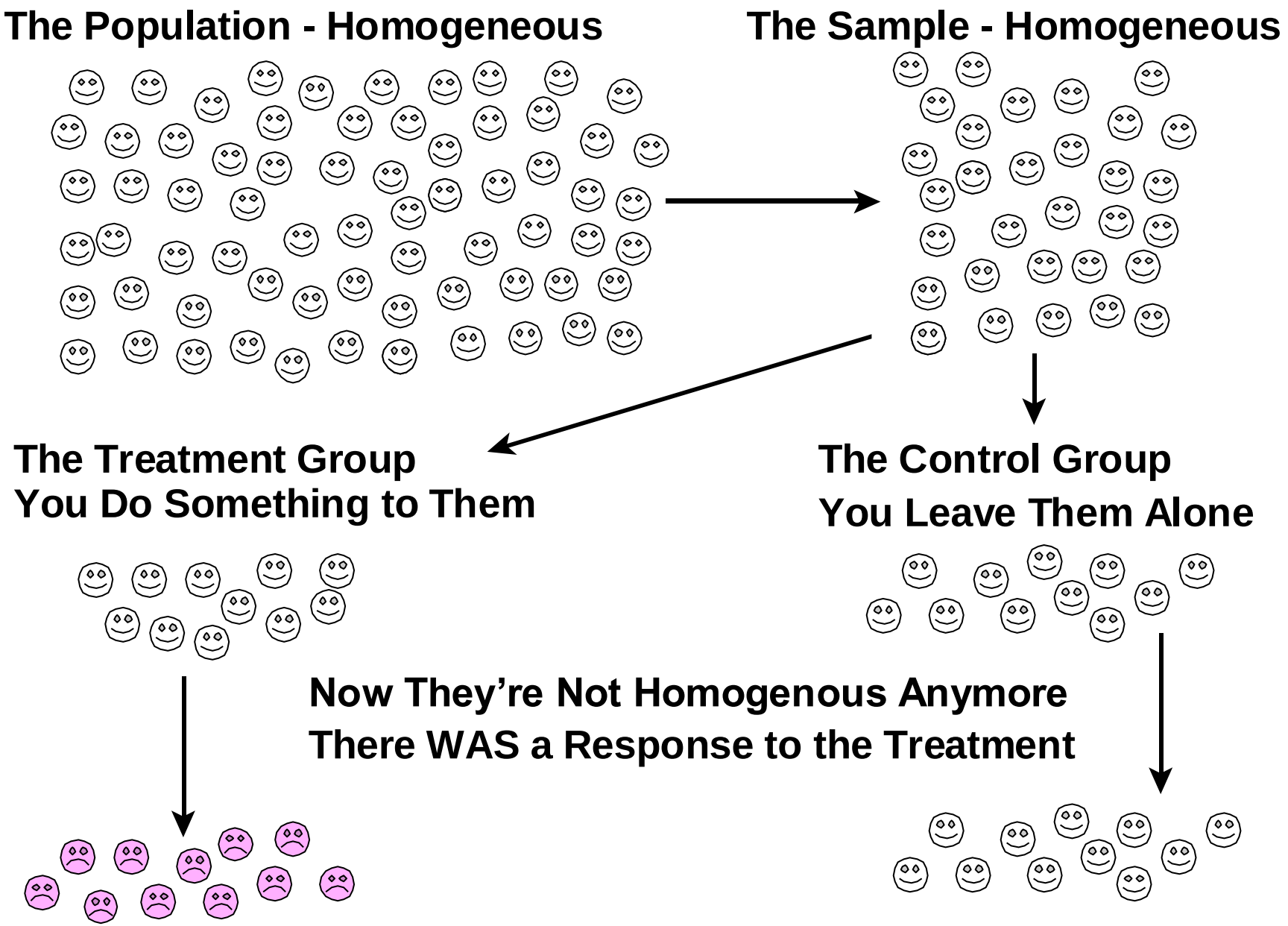
- Many true experiments do not use random selection. Volunteer samples are commonly used.
- This is because we will ***do something*** to the control group. Ethics often requires that they volunteer to have this done to them.
- Once selected, they may or may not get the treatment. They are ***randomly assigned*** to treatment versus control.
- All participants must understand that they may or may not get the treatment.

Treatment vs. Control

- The true experiment requires that the researcher (or someone s/he hires or some program) actually does something to one group (treatment) and does ***nothing or a traditional "tried and tested" intervention*** to the control group.
- This is more than just asking questions. It is an intervention that we hypothesize will change the person. This could be an educational program, a mentoring program, counseling.
- The point is, you must "poke" the treatment group and "not poke" the control group.

Ethics & the Control Group

- Ethics require (in the form of IRB approval) that we do ***something*** for the control group when the condition the participants have is harmful to them. We can't just say "tough luck, no treatment for you."
- In most cases, we therefore give the control group a traditional (already tried) or less intensive intervention.
- We might give the adolescent females in the control group a set of written materials about how to improve self-esteem, for example. This would be a "less intensive" intervention than our mentoring program.
- There are designs, like the switching replications design, that do ensure that all participants eventually get the treatment. See the "cheat sheet" and de Vaus' discussion of types of experiments.


The Population - Homogeneous
The Sample - Homogeneous
The Treatment Group
You Do Something to Them
The Control Group
You Leave Them Alone
Now They're Not Homogenous Anymore
There WAS a Response to the Treatment

True Experiments

Did you select a representative sample of test cases from a single homogenous population?

Yes **No** → **Not a True Experiment**

Did you assign test subjects or cases randomly to treatment and control groups?

Yes **No** → **Not a True Experiment**

Did you then do something to treatment groups that you did not do to the control group and then mea- the responses of both treatment & control groups?

Yes **No** → **Not a True Experiment**

True Experiment

Analysis of True Experiments

- The true experiment answers the question: “Is there a difference in the ***average*** performance of participants in the treatment and control groups?”
- The form of the research question tends to dictate the type of data collected and the types of analyses used

Types of Data & Analyses

- Average implies interval data or at least ordinal data.
- The most common analyses are t-tests, the Mann-Whitney U test, ANOVA, and the Kruskal-Wallis test because these tests allow us to compare the differences in ***average*** post-test scores (or, more commonly average change from pre- to post-test score) between two or more groups (treatment and control).

The Classic Experiment

- Select representative, homogeneous sample
- Randomly assign to control and treatment groups
- Measure the outcome (dependent) variable for both groups
- Do something to the treatment group
- Measure the outcome variable again for both groups