

Randomized Block Design

by Sophia



WHAT'S COVERED

This tutorial is going to teach you about a randomized block design. A randomized block design is a little bit different than other types of designs that we've studied so this tutorial will focus on:

1. [Randomized Design](#)
2. [Block Design vs. Randomized Design](#)

1. Randomized Design

Randomized block design is a type of experiment where participants are first divided into homogenous groups. This means that they are the same across some variable of interest, such as age, race, income, location, job, or gender.

Once participants are in their similar group, they are randomly assigned to treatment or control within that group.

An advantage is that it controls for variables that would otherwise be confounding. If we think that job has an effect, we can make sure that a proportion number of people who have the same job are assigned a treatment and control group.

A disadvantage is that it can reduce the sample size of each group.

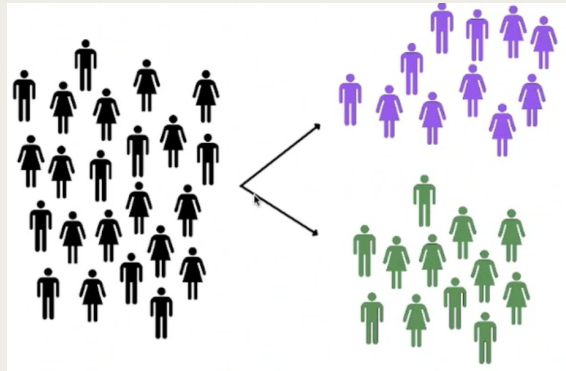
IN CONTEXT

Suppose you are a researcher and you want to identify whether a new acid reflux drug is more effective than the one that's currently available. You gather 500 volunteers with acid reflux, put the number one on 250 cards, and the number two on another 250, and place all the cards in a hat. You mix them up and have people pull out numbers.

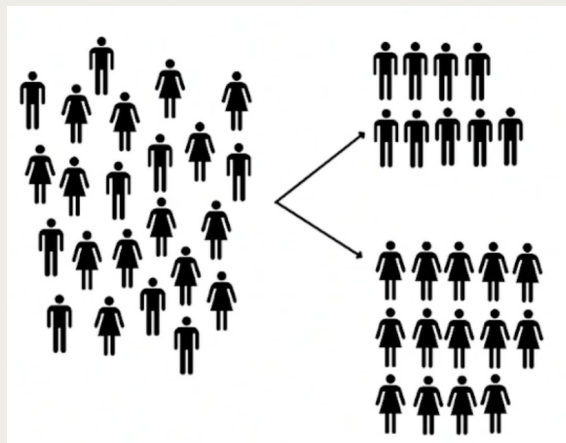
People who received a "1" receive a new drug, and those who selected "2" received the old drug. The image below would be your original plan, starting with all these volunteers, men and women, and then

you randomly assigned them to groups.

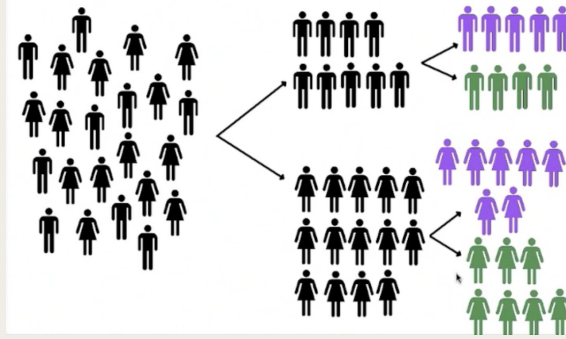
The problem is, what if men and women respond differently to the drug?



The better design is using a *randomized block design*, so you try something different. First, take your large group and break it into smaller subgroups of just men and just women.



The image above has nine men and 14 women; you had a lot more in the old design, but now you're going to run the experiments essentially in parallel: one experiment for men and one experiment for women. Now you're going to take the men and randomly assign half of them to the treatment and half to the control. You're going to take half the women and assign them to the treatment and assign them to the control, which looks like this:



Men and women receiving the treatment are in purple, and the men and women receiving the control are in green. You might notice there are five men receiving treatment and only four receiving control. It's not necessary to have exactly sized groups.



TERM TO KNOW

Randomized Block Design

An experimental design where the subjects are separated into homogeneous groups, called blocks, based on some variable we think may affect the outcome of the experiment. We then run the experiment separately within each block.

2. Block Design vs. Randomized Design

By doing a block design rather than a completely randomized design, you can observe differences within the group that you might have missed had you done it with a large group.

⇒ **EXAMPLE** Suppose the drug was more effective for women than for men. You would see that in this experiment here. You would see that the drug was effective for women. You would also see that it wasn't effective for men.

One minor disadvantage to running a block design is that you do lose some of the replication that you would have if you had run it in a large group. Sometimes you need to make your sample size a little bit bigger to overcome that. It might be a little bit harder to draw legitimate conclusions with small groups.



SUMMARY

In a randomized design, you saw how an experiment might miss an extra level of depth, such as men and women reacting differently to a drug. The subjects or experimental units are grouped by some similar characteristic that you think might affect the outcome. In this example, we used gender. When evaluating block design vs. randomized design, you saw that with a randomized block design, experiments run in parallel, resulting in two or more separate experiments. Then, you can compare the treatments within each of those groups.

Good luck!

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