# How to conduct A/B Testing

<https://blog.hubspot.com/marketing/how-to-do-a-b-testing>

## Before the A/B Testing

1. Pick one variable to test.

As we optimize our application, we might find there are a few variables we want to test. But to evaluate how effective a change is, we will want to isolate one “independent variable” and measure its performance for avoiding confounding effect. Otherwise, we can’t be sure which one was responsible for changes in performance.

If we decide to test multiple factors, we can run multiple A/B Testing and be sure we are testing them one at a time.

**Note:** There are sometimes when it makes more sense to test multiple variables rather than a single variable. This is a process called multivariate testing. When to use multivariate testing? If we would like to reveal more information about how different variables interact with one another and measure the effectiveness each design combination has on the ultimate goal, then we should go with multivariate testing.

1. Identify our goal.

Although we might measure a number of metrics for every one test, choose a primary metric to focus on before we run the test.

State an official hypothesis test (and determine whether it’s a two-tailed test or one-tailed test).

1. Determine control and treatment groups.

Control group: original version.

Treatment group: new design.

Note: we need to determine if the control and treatment groups should come from the same market? Consider network effect in this scenario, and determine whether there is an interaction between two groups. If there is, we should pick comparable markets in pairs and assign one market with original version and another market with new design.

1. Split our sample groups equally and randomly.
2. Determine sample size, which depends on:

* Statistical power (1-type II error, eg, 0.8)
* Significant level (type I error, eg, 0.05)
* Standard deviation in each level
* Minimum minimal detectable difference we would like to see in our data

Based on the sample size and DAU or MAU, we can estimate how long this test will be.

1. Make sure we are not running multiple tests on a same factor at the same time.

## During the A/B test

1. Test both designs simultaneously.
2. Give the A/B test enough time to produce useful data.
3. Ask for feedback from real users.

A/B testing has a lot to do with quantitative data… but that won’t necessarily help us understand why people take certain actions over others. While we are running A/B test, we can collect qualitative feedback from real users.

## After the A/B Test

1. Focus on goal metric
2. Measure the significance of our results using corresponding test.
3. Take action based on our results

If one variation is statistically better than the other, we have winner. We can complete our test by disabling the losing variation in our A/B testing.

If neither variation is statistically better, we can’t reject the null hypothesis by current data. Either we stick with the original version or run another test.