## Two random variables

In the context of an experiment, the success rate in group A and B are Bernoulli random variables with expected value and variance respectively :

with and

with and

## Combined random variables

If we want to compare the success rate between two Bernoulli random variables A and B, we can create a random variable (which mean is expected to be zero). Assuming A and B are IID :

According to the central limit theorem, if , are random samples each of size taken from , then the sampling distribution of means will be approximately normal for large sample sizes (over 30) with the following statistical properties.

Therefore :

## Hypothesis test

We can now set the hypothesis for our test :

Since the variance of both random variables is the same under the null hypothesis, we can rewrite the test statistic using a pooled variance based on the Satterthwaite Approximation :

Where  is the weighted average of and

We approximate the probabilities and with their empirical equivalent and to compute the pooled probability and the score.