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**Student**: Tiago B. Lacerda

This work was carried out in week 7 of the course "improving your scientific inference" taught by Professor Lakens and available on the Coursera platform ( https://www.coursera.org/learn/statistical-inferences/home/welcome) and is part of the prerequisites for completing the course and obtaining a certificate.

# Q1. Write down your theoretical hypothesis

Hypothesis: “There are no significant changes in the quality of war films before and after 2010 as measured by their rating on the IMDB site.”

# Q2. Write down which **dependent variables** you will measure

I Predict that there is no difference in quality between war movies before and after 2010 as measured by IMDB ratings. I will do a power analysis for an equivalent test. I want to reject my SESOI with confidence so I will setup 90% my test with power and alpha = 5% and want to detect effects greater than Cohen’s d = 0.2 (small effects).

**Q3. Justify your sample size**

The power analysis estimates that the sample size we need to show de difference in ratings of war films before and after 2010 is smaller than Cohen’s d= 0.2 (assuming the true effect size is 0, alpha = 5% and power at 90%). is 542 samples per group.

> powerTOSTtwo(alpha = 0.05, statistical\_power = 0.9, low\_eqbound\_d = -0.2, high\_eqbound\_d =0.2)

**The required sample size to achieve 90 % power with equivalence bounds of -0.2 and 0.2 is 542 per group, or 1084 in total.**

**[1] 541.1087**

**Q4) Specify the statistical test you will conduct**

I will perform an equivalence testing using Cohen’s d=0.2 as equivalence bounds ( - 0.2 and +0.2) along with alpha = 0.05 and power = 0.90.

Films released < 2010:

N = 1555

Average rating = 6,492733119

StdDev = 0,88388498

Films released >= 2010

N = 762

Average rating = 6,448293963

StdDev = 1,431852215

Result:

t-value lower bound: 5.00 p-value lower bound: 0.0000003

t-value upper bound: -3.42 p-value upper bound: 0.0003

degrees of freedom : 1053.75

Equivalence bounds (Cohen's d):

low eqbound: -0.2

high eqbound: 0.2

Equivalence bounds (raw scores):

low eqbound: -0.238

high eqbound: 0.238

TOST confidence interval:

lower bound 90% CI: -0.049

upper bound 90% CI: 0.137

NHST confidence interval:

lower bound 95% CI: -0.066

upper bound 95% CI: 0.155

Equivalence Test Result:

The equivalence test was significant, t(1053.75) = -3.425, p = 0.000319, given equivalence bounds of -0.238 and 0.238 (on a raw scale) and an alpha of 0.05.

Null Hypothesis Test Result:

The null hypothesis test was non-significant, t(1053.75) = 0.786, p = 0.432, given an alpha of 0.05.

**Conclusion: Based on the equivalence test and the null-hypothesis test combined, we can conclude that the observed effect is statistically not different from zero and statistically equivalent to zero.**

