P-hacking

Definition

P-hacking refers to the misuse and abuse of analysis techniques and results in being fooled by **false positives.**

It often happens under two types of settings.

1. When we have multiple experiments, we calculate the p-value **one by one** of experiments, then we have highly change to **"accidently" get a p-value under 0.05**. For solving this, we should calculate all p-value together and apply methods like **False Discovery rates** to get the **adjusted p-value**.
2. When we get p-value close to 0.05, we enlarge the sample size to make the p-value smaller, this is also p-hacking. For solving this, we need **to determine a proper sample** size before experiment using a **Power Analysis**.

Power Analysis

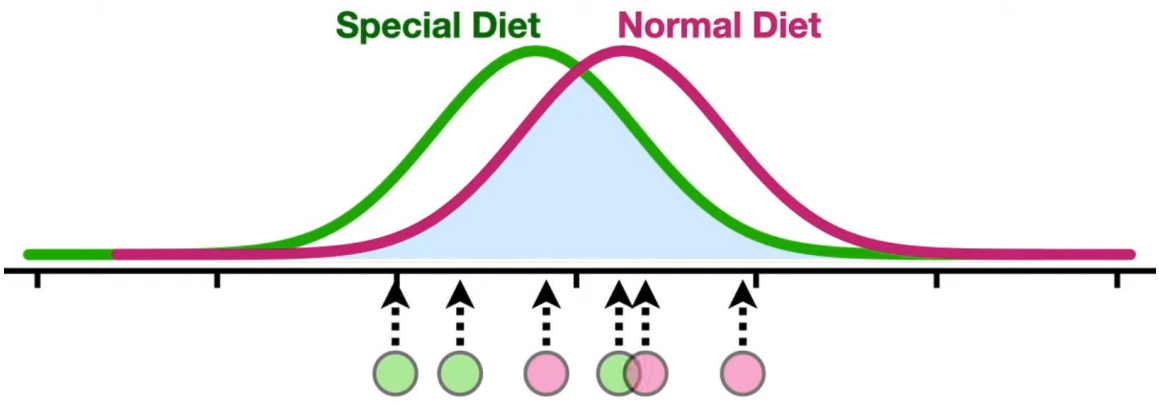
Statistical Power

Power is the probability that we will correctly reject the Null hypothesis. When there is a lot overlap between the two distributions and we have a small sample size, we have relatively low Power.

For example, if I want to have Power = 0.8, meaning, I want to have at least an 80% chance of correctly rejecting the Null Hypothesis.

Power is effects by many factors by two are dominant

1. **How much overlap there is between the two distributions** we want to identify with our study
2. **The sample size**: the number of measurements we collect from each group



A **Power Analysis** determines **what sample size will ensure a high probability that we correctly reject the Null Hypothesis** that there is no difference between the two groups.